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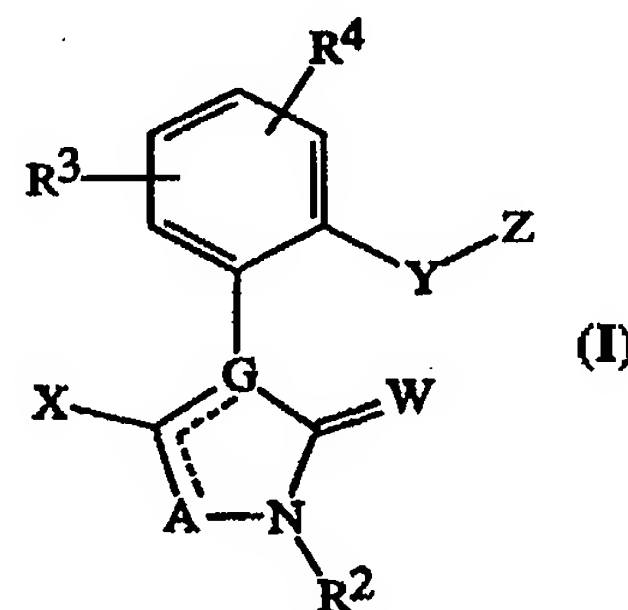
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(54) Title: FUNGICIDAL CYCLIC AMIDES

(57) Abstract

Cyclic amides of Formula (I) which are useful as fungicides wherein: A is O; S; N; NR⁵; or CR¹⁴; G is C or N; W is O or S; X is OR¹, S(O)_mR¹ or halogen; R¹, R², and R⁵ are independently, in part, C₁-C₆ alkyl; Y is, in part, -O-, -S(O)_n-, -CHR⁶O-, -OCHR⁶-, or -CHR⁶O-N=C(R⁷)-; Z is, in part, optionally substituted cycloalkyl, phenyl, pyridinyl, pyrimidinyl, or naphthyl; and R³, R⁴, R⁶, R⁷, R¹⁴, m, and n are defined in the disclosure, are disclosed.



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TITLE

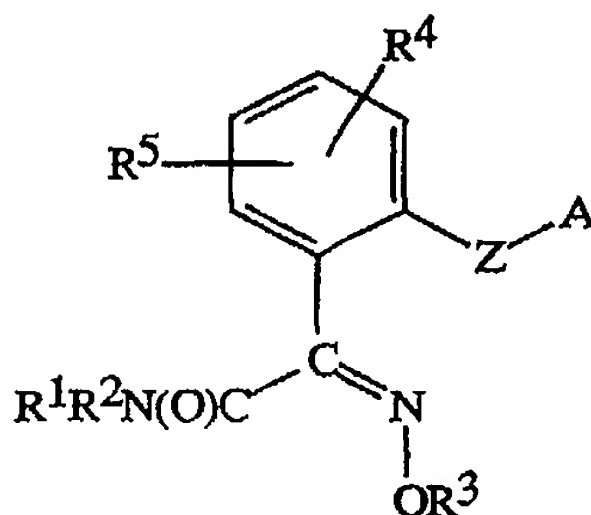
FUNGICIDAL CYCLIC AMIDES

BACKGROUND OF THE INVENTION

This invention relates to cyclic amides substituted at the α -position with various
 5 aryl groups, their agriculturally suitable salts and compositions, and methods of their use
 as general or selective fungicides.

EP-A-398,692 discloses amides of Formula i as fungicides for crop protection.

Compounds of Formula i are:



i

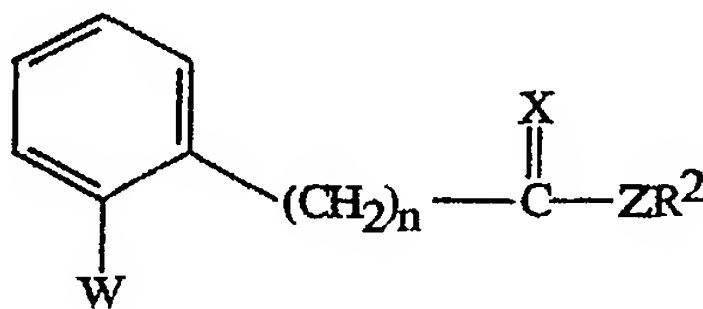
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wherein

R^1 and R^2 are each hydrogen, lower alkyl, or lower cycloalkyl.

All the compounds disclosed in EP-A-398,692 have an aryl moiety bonded to an
 acyclic alkoxyiminoacetamide group. The cyclic amides of the present invention are not
 15 disclosed therein.

WO 93/07116 discloses compounds of Formula ii as fungicides for crop
 protection. Compounds of Formula ii are:

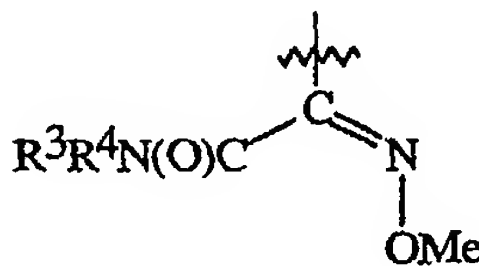
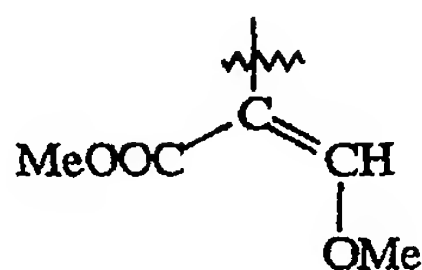


ii

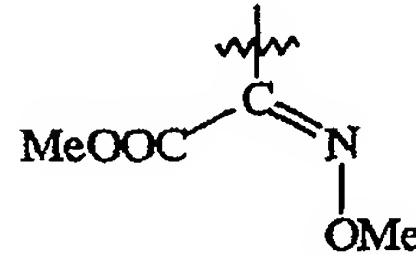
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wherein:

W is



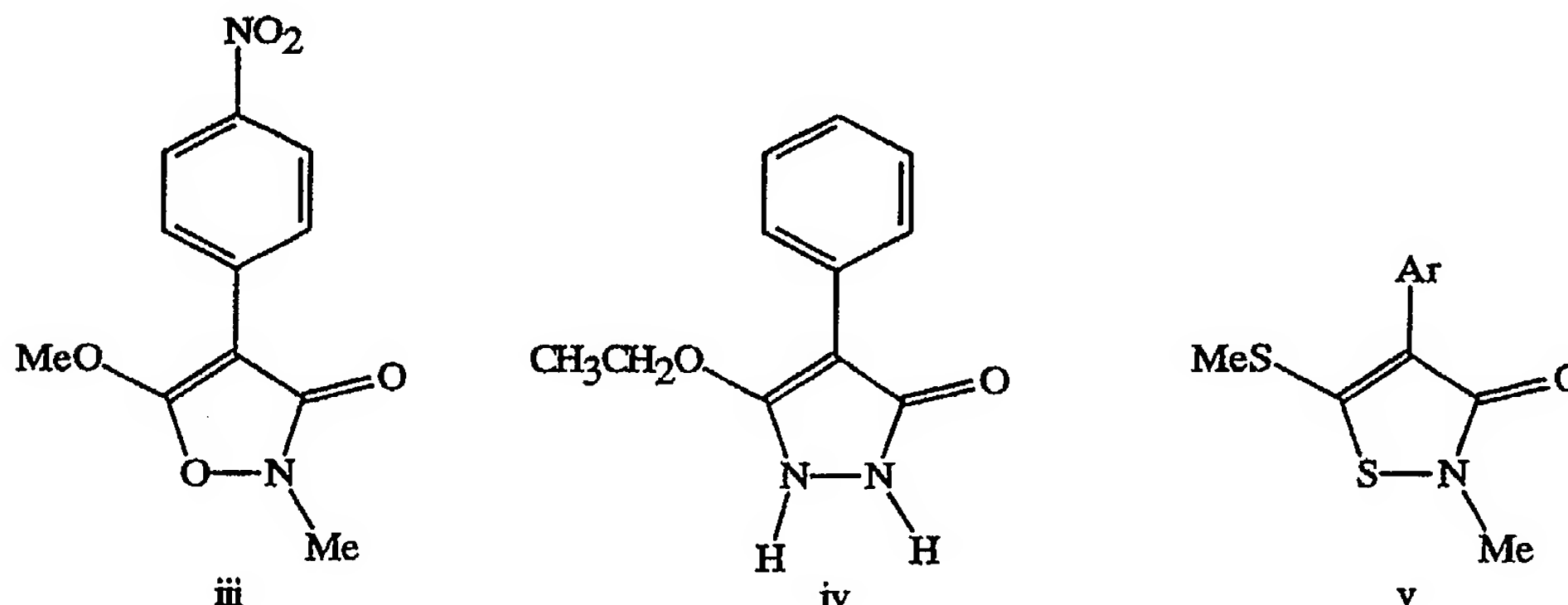
, or



Once again, the cyclic amides of this invention are not disclosed therein.

J. Heterocyclic Chem., (1987), 24, 465, *J. Heterocyclic Chem.*, (1988), 25, 1307, and *Australian J. Chem.*, (1977), 30 (8), 1815 disclose 4-nitrophenyl isoxazoles (iii), phenyl pyrazolones (iv), and aryl isothiazolinones (v) respectively.

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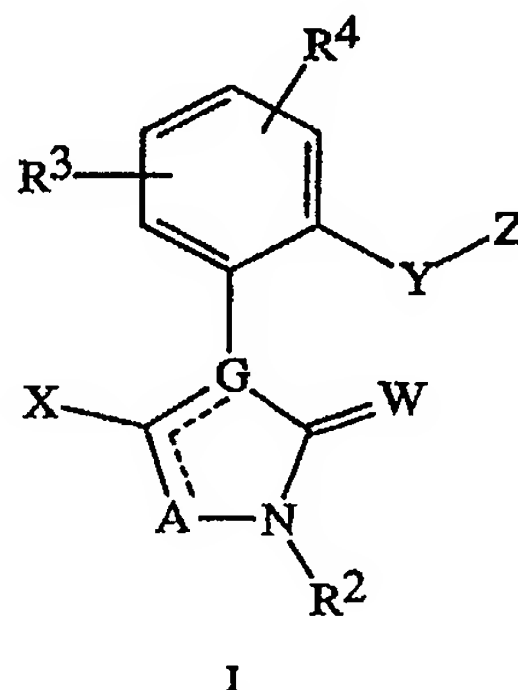


However, no utility as fungicides is alleged and no ortho-substituted compounds of the present invention are disclosed.

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SUMMARY OF THE INVENTION

This invention comprises compounds of Formula I including all geometric and stereoisomers, agriculturally suitable salts thereof, agricultural compositions containing them and their use as fungicides:



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wherein:

A is O; S; N; NR⁵; or CR¹⁴;

G is C or N; provided that when G is C, A is O, S or NR⁵ and the floating double bond is attached to G; and when G is N, A is N or CR¹⁴ and the floating double bond is attached to A;

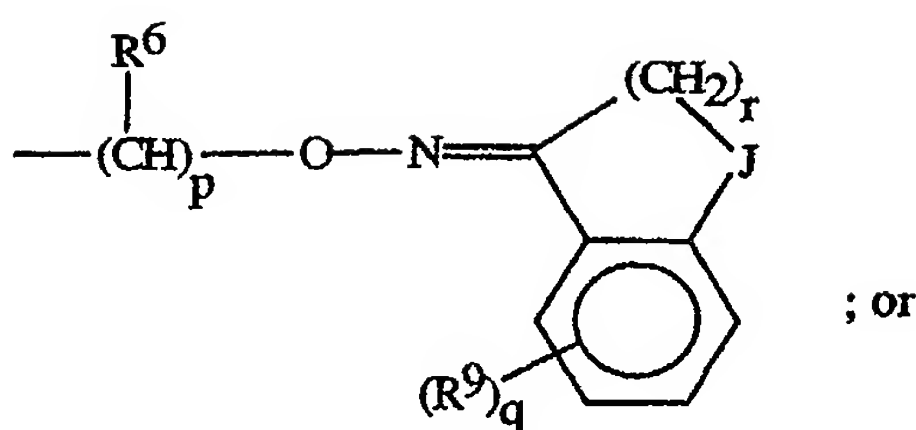
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W is O or S;

X is OR¹; S(O)_mR¹; or halogen;

- R^1 , R^2 , and R^5 are each independently H; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_2 - C_6 alkenyl; C_2 - C_6 haloalkenyl; C_2 - C_6 alkynyl; C_2 - C_6 haloalkynyl; C_3 - C_6 cycloalkyl; C_2 - C_4 alkylcarbonyl, C_2 - C_4 alkoxy carbonyl; or benzoyl optionally substituted with R^{13} ;
- 5 R^3 and R^4 are each independently H; halogen; cyano; nitro; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_2 - C_6 alkenyl; C_2 - C_6 haloalkenyl; C_2 - C_6 alkynyl; C_2 - C_6 haloalkynyl; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; C_2 - C_6 alkenyloxy; or C_2 - C_6 alkynyloxy;
- 10 Y is $-O-$; $-S(O)_n-$; $-CHR^6CHR^6-$; $-CR^6=CR^6-$; $-C\equiv C-$; $-CHR^6O-$; $-OCHR^6-$; $-CHR^6S(O)_n-$; $-S(O)_nCHR^6-$; $-CHR^6O-N=C(R^7)-$; $-(R^7)C=N-OCH(R^6)-$; $-C(R^7)=N-O-$; $-O-N=C(R^7)-$; $-CHR^6OC(=O)N(R^{15})-$; or a direct bond; and the directionality of the Y linkage is defined such that the moiety depicted on the left side of the linkage is bonded to the phenyl ring and the moiety on the right side of the linkage is bonded to Z;
- 15 R^6 is independently H or C_1 - C_3 alkyl;
- R^7 is H; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; C_2 - C_6 alkenyl; C_2 - C_6 haloalkenyl; C_2 - C_6 alkynyl; C_2 - C_6 haloalkynyl; C_3 - C_6 cycloalkyl; C_2 - C_4 alkylcarbonyl; C_2 - C_4 alkoxy carbonyl; cyano; or morpholinyl;
- 20 Z is C_1 - C_{10} alkyl, C_2 - C_{10} alkenyl, or C_2 - C_{10} alkynyl each optionally substituted with R^8 ; or Z is C_3 - C_8 cycloalkyl or phenyl each optionally substituted with one of R^9 , R^{10} , or both R^9 and R^{10} ; or Z is a 3 to 14-membered nonaromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, or Z is a 5 to 14-membered aromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, each nonaromatic or aromatic ring system containing 1 to 6 heteroatoms independently selected from the group
- 25 1-4 nitrogen, 1-2 oxygen, and 1-2 sulfur, each nonaromatic or aromatic ring system optionally substituted with one of R^9 , R^{10} , or both R^9 and R^{10} ; or
- 30 R^7 and Z are taken together to form $CH_2CH_2CH_2$, $CH_2CH_2CH_2CH_2$, $CH_2CH_2OCH_2CH_2$, each CH_2 group optionally substituted with 1-2 halogen; or
- Y and Z are taken together to form

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5 R^3 , Y, and Z are taken together with the phenyl ring to form a naphthalene ring substituted on either ring with a floating R^4 ; provided that when R^3 , Y, and Z are taken together with the phenyl ring to form a naphthylene ring substituted by R^4 , and A is S, W is O, X is SCH_3 and R^2 is CH_3 , then R^4 is other than H;

J is $-CH_2-$; $-CH_2CH_2-$; $-OCH_2-$; $-CH_2O-$; $-SCH_2-$; $-CH_2S-$; $-N(R^{16})CH_2-$; or $-CH_2N(R^{16})-$; each CH_2 group optionally substituted with 1 to 2 CH_3 ;

10 R^8 is 1-6 halogen; C_1-C_6 alkoxy; C_1-C_6 haloalkoxy; C_1-C_6 alkylthio; C_1-C_6 haloalkylthio; C_1-C_6 alkylsulfinyl; C_1-C_6 alkylsulfonyl; C_3-C_6 cycloalkyl; C_3-C_6 alkenyloxy; $CO_2(C_1-C_6 \text{ alkyl})$; $NH(C_1-C_6 \text{ alkyl})$; $N(C_1-C_6 \text{ alkyl})_2$; cyano; or nitro; or R^8 is phenyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, furanyl, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and R^{12} ;

15 R^9 is 1-2 halogen; C_1-C_6 alkyl; C_1-C_6 haloalkyl; C_1-C_6 alkoxy; C_1-C_6 haloalkoxy; C_2-C_6 alkenyl; C_2-C_6 haloalkenyl; C_2-C_6 alkynyl; C_1-C_6 alkylthio; C_1-C_6 haloalkylthio; C_1-C_6 alkylsulfinyl; C_1-C_6 alkylsulfonyl; C_3-C_6 cycloalkyl; C_3-C_6 alkenyloxy; $CO_2(C_1-C_6 \text{ alkyl})$; $NH(C_1-C_6 \text{ alkyl})$; $N(C_1-C_6 \text{ alkyl})_2$; $-C(R^{18})=NOR^{17}$; cyano; or nitro; or R^9 is phenyl, benzyl, benzoyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, thienyloxy, furanyl, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and R^{12} ;

25 R^{10} is halogen; C_1-C_4 alkyl; C_1-C_4 haloalkyl; C_1-C_4 alkoxy; nitro; or cyano; or R^9 and R^{10} , when attached to adjacent atoms, are taken together as $-OCH_2O-$ or $-OCH_2CH_2O-$; each CH_2 group optionally substituted with 1-2 halogen;

R^{11} and R^{12} are each independently halogen; C_1-C_4 alkyl; C_1-C_4 haloalkyl; C_1-C_4 alkoxy; C_1-C_4 haloalkoxy; nitro; or cyano;

R^{13} is halogen; C_1-C_3 alkyl; C_1-C_3 haloalkyl; C_1-C_3 alkoxy; C_1-C_3 haloalkoxy; nitro; or cyano;

30 R^{14} is H; halogen; C_1-C_6 alkyl; C_1-C_6 haloalkyl; C_2-C_6 alkenyl; C_2-C_6 haloalkenyl; C_2-C_6 alkynyl; C_2-C_6 haloalkynyl; or C_3-C_6 cycloalkyl;

R^{15} , R^{16} , R^{17} , and R^{18} are each independently H; C_1 - C_3 alkyl; or phenyl optionally substituted with halogen, C_1 - C_4 alkyl, C_1 - C_4 haloalkyl, C_1 - C_4 alkoxy, C_1 - C_4 haloalkoxy, nitro or cyano;

m, n and q are each independently 0, 1 or 2; and

5 p and r are each independently 0 or 1.

In the above recitations, the term "alkyl", used either alone or in compound words such as "haloalkyl" denotes straight-chain or branched alkyl; e.g., methyl, ethyl, *n*-propyl, *i*-propyl, or the different butyl, pentyl or hexyl isomers. "Alkenyl" denotes straight-chain or branched alkenes; e.g., 1-propenyl, 2-propenyl, and the different butenyl, pentenyl and hexenyl isomers. "Alkenyl" also denotes polyenes such as 1,3-hexadiene. "Alkynyl" denotes straight-chain or branched alkynes; e.g., ethynyl, 1-propynyl, 3-propynyl and the different butynyl, pentynyl and hexynyl isomers. "Alkynyl" can also denote moieties comprised of multiple triple bonds; e.g., 2,4-hexadiyne. "Alkoxy" denotes, for example, methoxy, ethoxy, *n*-propyloxy, isopropyloxy and the different butoxy, pentoxy and hexyloxy isomers. "Alkenyloxy" denotes straight-chain or branched alkenyloxy moieties. Examples of alkenyloxy include $H_2C=CHCH_2O$, $(CH_3)_2C=CHCH_2O$, $(CH_3)CH=CHCH_2O$, $(CH_3)CH=C(CH_3)CH_2O$ and $CH_2=CHCH_2CH_2O$. "Alkynyloxy" denotes straight-chain or branched alkynyloxy moieties. Examples include $HC\equiv CCH_2O$, $CH_3C\equiv CCH_2O$ and $CH_3C\equiv CCH_2CH_2O$. The term "halogen", either alone or in compound words such as "haloalkyl", denotes fluorine, chlorine, bromine or iodine. Further, when used in compound words such as "haloalkyl", said alkyl may be partially or fully substituted with halogen atoms which may be the same or different. Examples of "haloalkyl" include F_3C , $ClCH_2$, CF_3CH_2 and CF_3CCl_2 . The term "cycloalkyl" denotes cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl moieties. The term "nonaromatic heterocyclic ring system" includes fully saturated heterocycles and partially aromatic heterocycles. The total number of carbon atoms in a substituent group is indicated by the " C_i - C_j " prefix where i and j are numbers from 1 to 10. For example, C_1 - C_3 alkyl designates methyl through propyl; C_2 alkoxy designates CH_3CH_2O ; and C_3 alkoxy designates, for example, $CH_3CH_2CH_2O$ or $(CH_3)_2CHO$. In the above recitations, when a compound of Formula I is comprised of one or more aromatic nitrogen-containing rings (e.g., pyridinyl and pyrimidinyl), all bonds to these heterocycles are made through the carbon atom(s) of the moieties.

Preferred compounds, compositions containing them, and methods of their use for reasons of better activity and/or ease of synthesis are:

35 Preferred 1. Compounds of Formula I above wherein:

W is O;

R^1 is C_1 - C_3 alkyl or C_1 - C_3 haloalkyl;

R^2 is H; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; or C_3 - C_6 cycloalkyl;

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R^3 and R^4 are each independently H; halogen; cyano; nitro; C_1 - C_6 alkyl;
 C_1 - C_6 haloalkyl; C_1 - C_6 alkoxy; or C_1 - C_6 haloalkoxy;

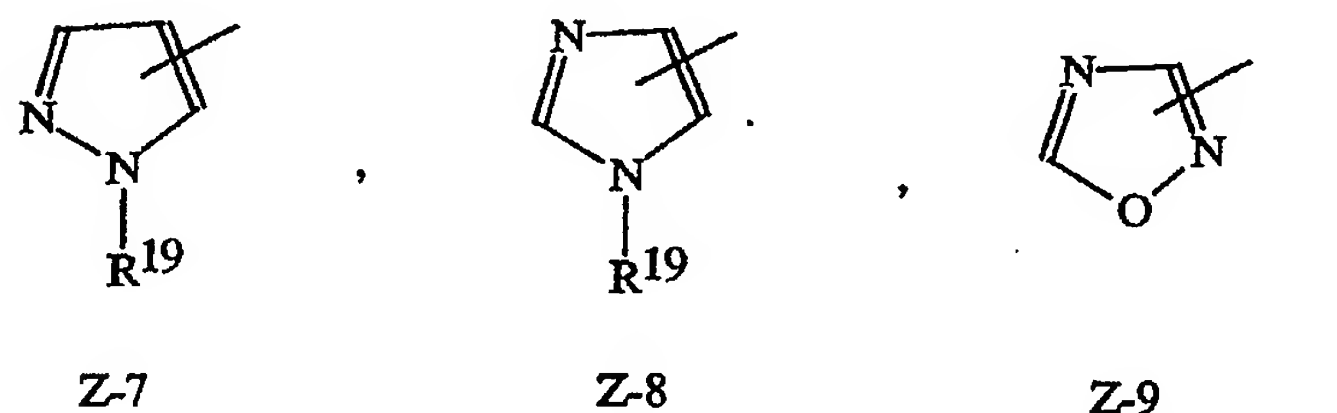
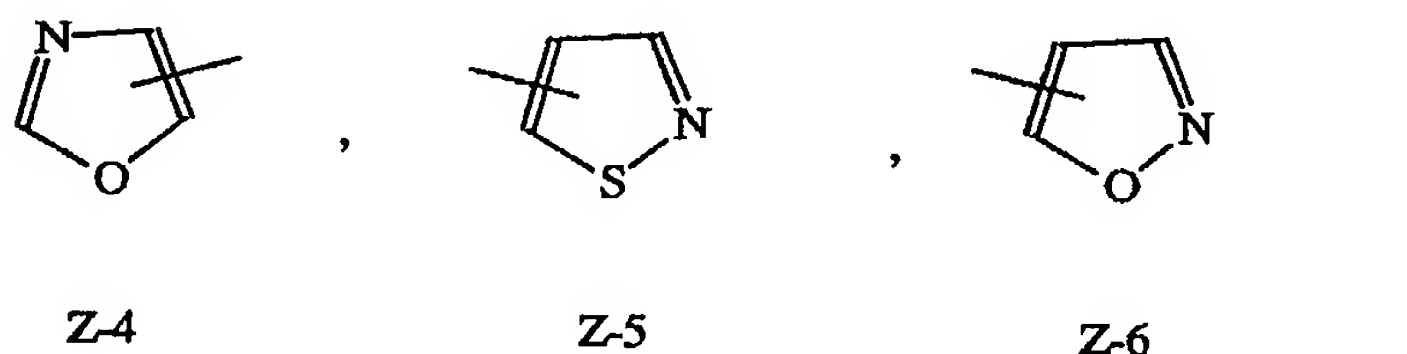
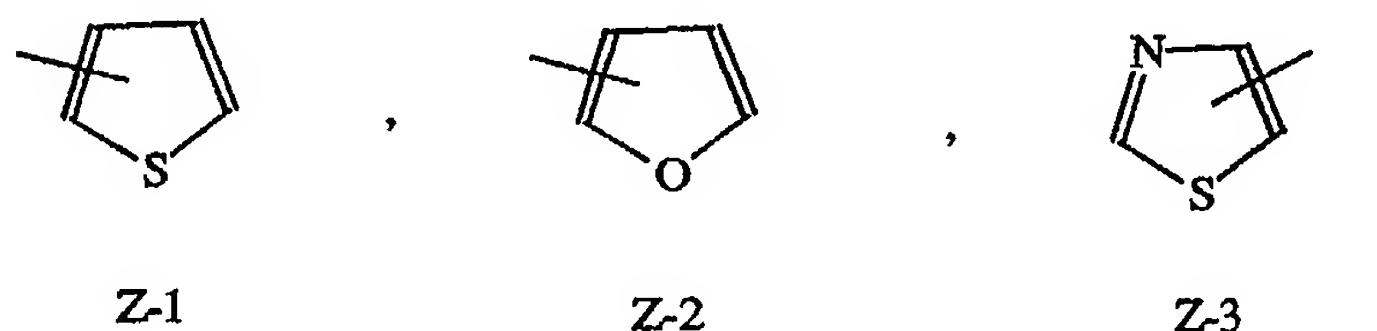
Y is -O-; -CH=CH-; -CH₂O-; -OCH₂-; -CH₂S(O)_n-; -CH₂O-N=C(R⁷)-;
 -C(R⁷)=N-O-; -CH₂OC(O)NH-; or a direct bond;

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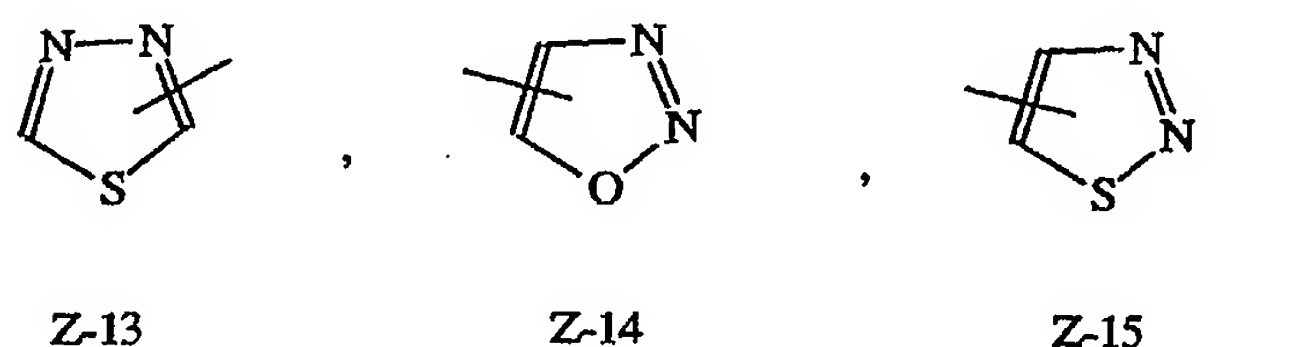
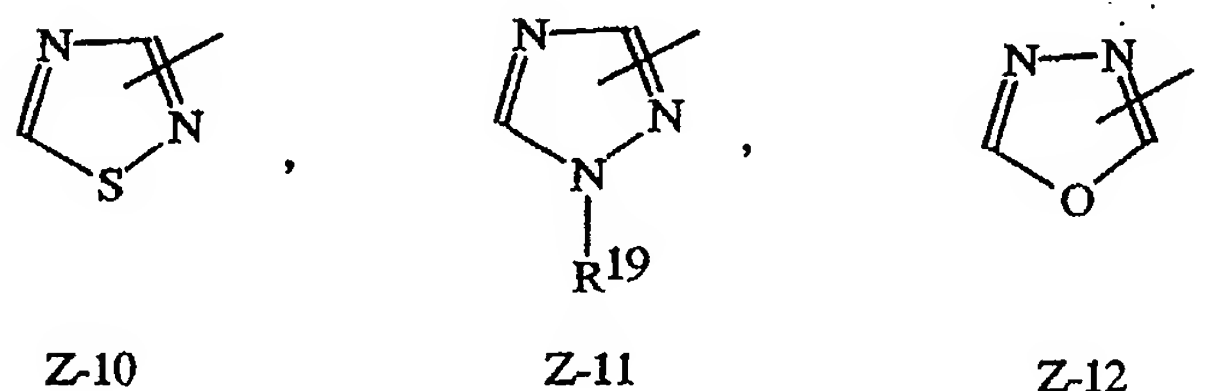
R^7 is H; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_2 - C_6 alkenyl; C_2 - C_6 alkynyl; or
 cyano;

Z is C_1 - C_{10} alkyl optionally substituted with R^8 ; or C_3 - C_8 cycloalkyl or
 phenyl, each optionally substituted with one of R^9 , R^{10} , or both R^9
 and R^{10} ; or Z is

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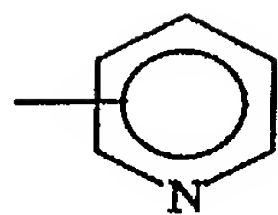


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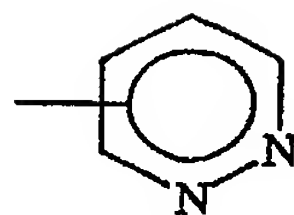
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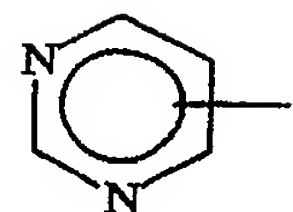
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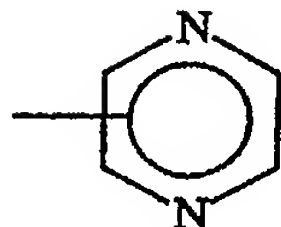


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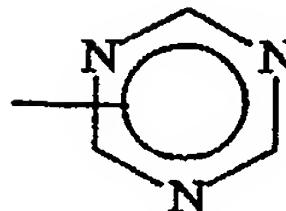


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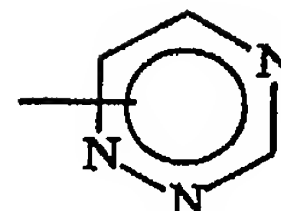
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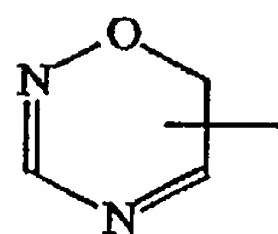
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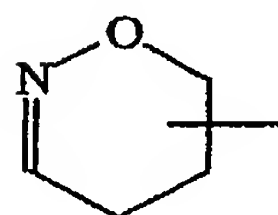
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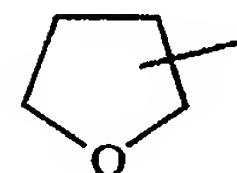
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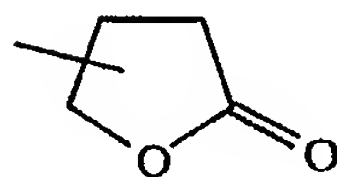
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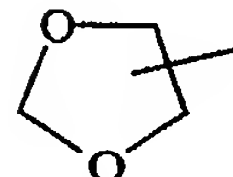
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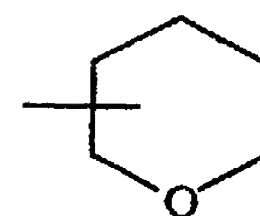
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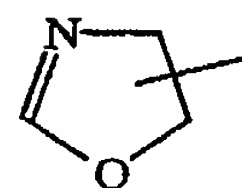
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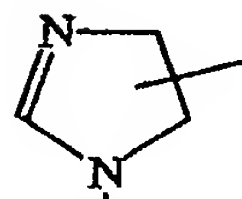
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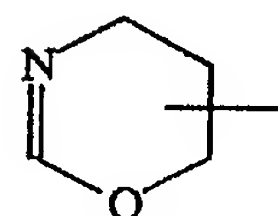
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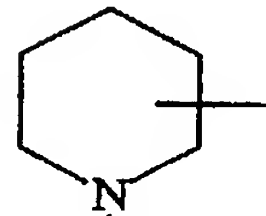
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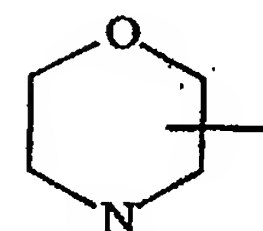
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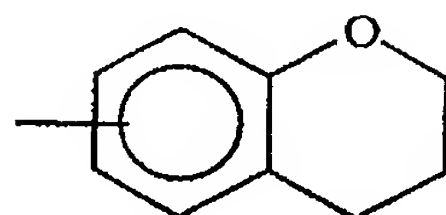
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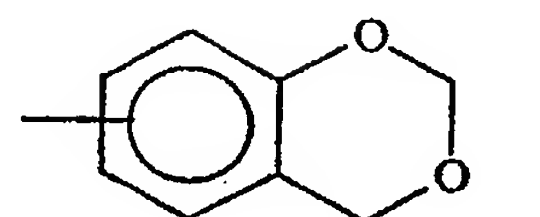
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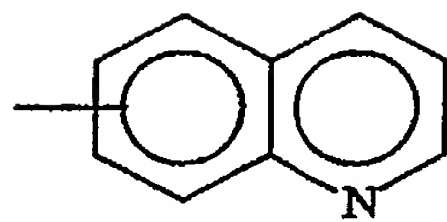


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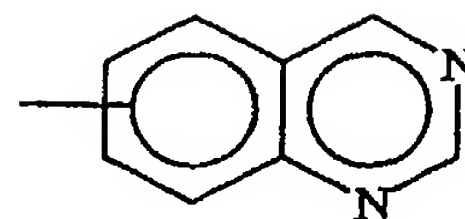
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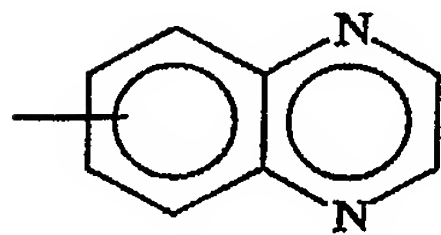
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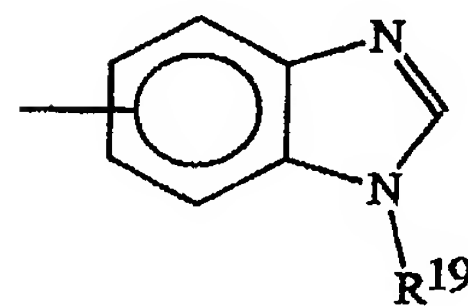
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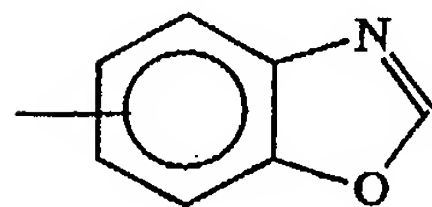


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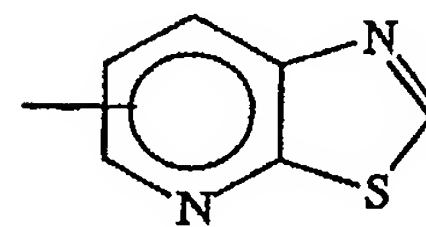


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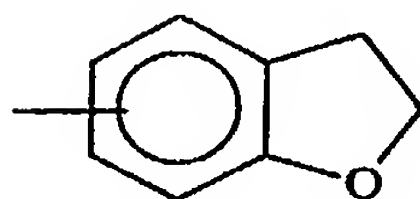
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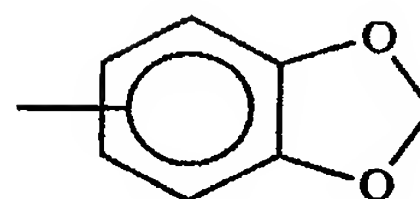
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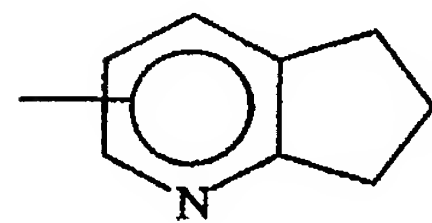
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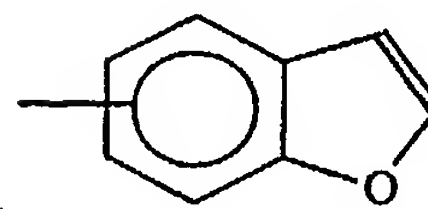
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Z-43

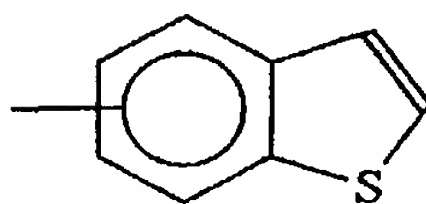


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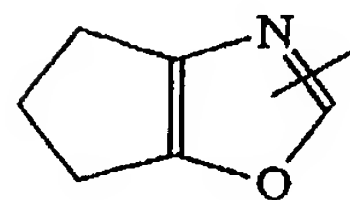


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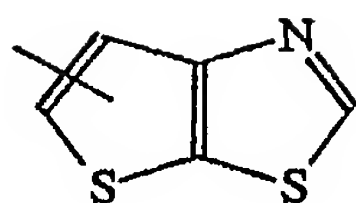


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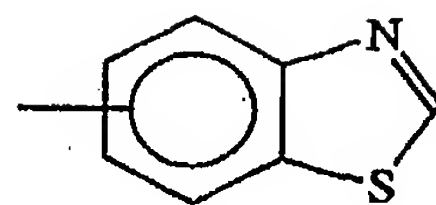
Z-47

9



Z-48

or

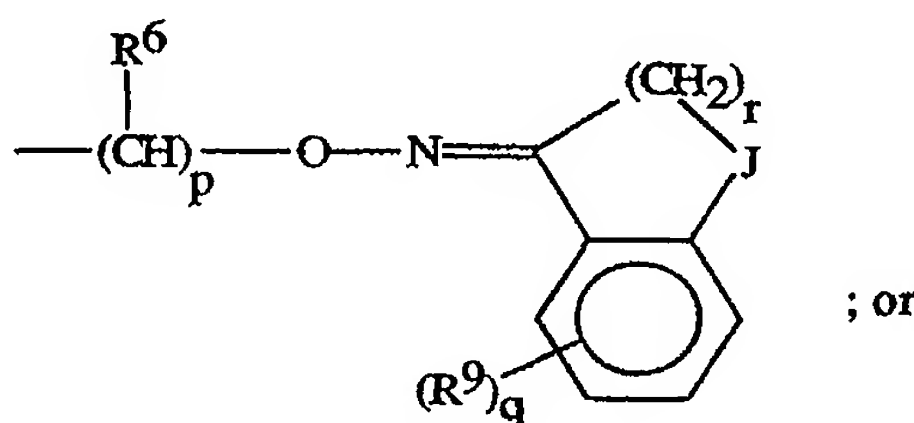


Z-49

each group optionally substituted with one R^9 , R^{10} , or both R^9 and R^{10} ;
or

5

R^3 , Y, and Z are taken together with the phenyl ring to form a
naphthalene ring substituted on either ring with a floating R^4 ; or
Y and Z are taken together to form



; or

10

R^8 is 1-6 halogen; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; or R^8 is phenyl,
phenoxy, pyridinyl, pyridinyloxy, pyrimidinyl, or pyrimidinyloxy
each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and
 R^{12} ;

15

R^9 is 1-2 halogen; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_1 - C_6 alkoxy; C_1 - C_6
haloalkoxy; C_1 - C_6 alkylthio; cyano; $CO_2(C_1$ - C_6 alkyl); $NH(C_1$ - C_6
alkyl); or $N(C_1$ - C_6 alkyl) $_2$; or R^9 is C_3 - C_6 cycloalkyl, phenyl,
phenoxy, pyridinyl, pyridinyloxy, pyrimidinyl, or pyrimidinyloxy
each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and
 R^{12} ; and

20

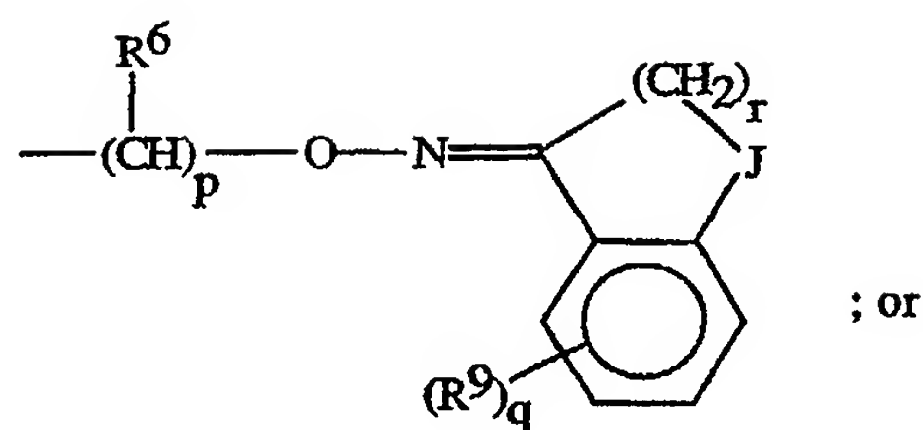
R^{19} is H; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; or phenyl optionally substituted
with halogen, C_1 - C_4 alkyl, C_1 - C_4 haloalkyl, C_1 - C_4 alkoxy, C_1 - C_4
haloalkoxy, nitro or cyano.

Preferred 2. Compounds of Preferred 1 wherein:

25

Z is phenyl or Z-1 to Z-21, each optionally substituted with one of R^9 ,
 R^{10} , or both R^9 and R^{10} ; or
Y and Z are taken together to form

10



J is $-\text{CH}_2-$ or $-\text{CH}_2\text{CH}_2-$;

p is 0; and

r is 1.

5 Preferred 3. Compounds of Preferred 2 wherein:

A is O; N; NR^5 ; or CR^{14} ;

X is OR^1 ;

R^1 is C_1 - C_3 alkyl;

R^2 is H or C_1 - C_2 alkyl;

10 R^3 and R^4 are each H;

Y is $-\text{O}-$; $-\text{CH}=\text{CH}-$; $-\text{CH}_2\text{O}-$; $-\text{OCH}_2-$; $-\text{CH}_2\text{O}-\text{N}=\text{C}(\text{R}^7)-$; or
 $-\text{CH}_2\text{OC}(=\text{O})\text{NH}-$;

R^7 is H; C_1 - C_3 alkyl; or C_1 - C_3 haloalkyl; and

15 Z is phenyl, pyridinyl, pyrimidinyl, or thienyl, each optionally substituted
 with one of R^9 , R^{10} , or both R^9 and R^{10} .

Preferred 4. Compounds of Preferred 3 wherein:

A is O or NR^5 ;

G is C;

Y is $-\text{O}-$; $-\text{CH}_2\text{O}-$; $-\text{OCH}_2-$; or $-\text{CH}_2\text{O}-\text{N}=\text{C}(\text{R}^7)-$; and

20 R^7 is H; C_1 - C_2 alkyl; or C_1 - C_2 haloalkyl.

Preferred 5. Compounds of Preferred 3 wherein:

A is N or CR^{14} ;

G is N;

Y is $-\text{O}-$; $-\text{CH}_2\text{O}-$; $-\text{OCH}_2-$; or $-\text{CH}_2\text{O}-\text{N}=\text{C}(\text{R}^7)-$; and

25 R^7 is H; C_1 - C_2 alkyl; or C_1 - C_2 haloalkyl.

Preferred 6. Compounds of Preferred 4 wherein:

R^1 is methyl;

R^2 is methyl; and

Z is phenyl optionally substituted with one of R^9 , R^{10} , or both R^9 and
 30 R^{10} .

Preferred 7. Compounds of Preferred 5 wherein:

R^1 is methyl;

R^2 is methyl; and

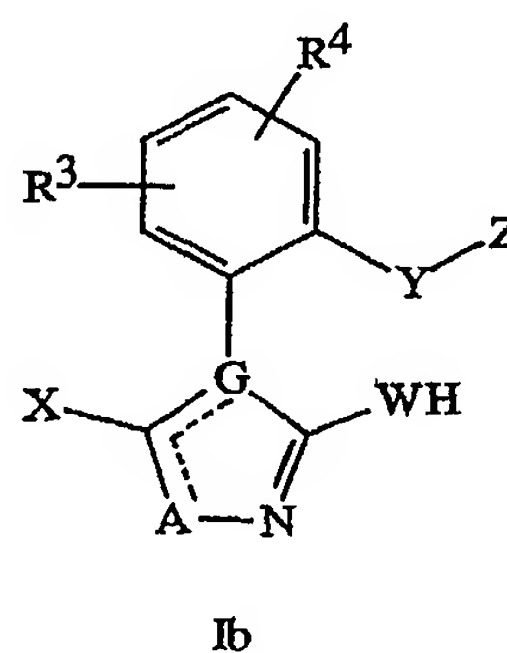
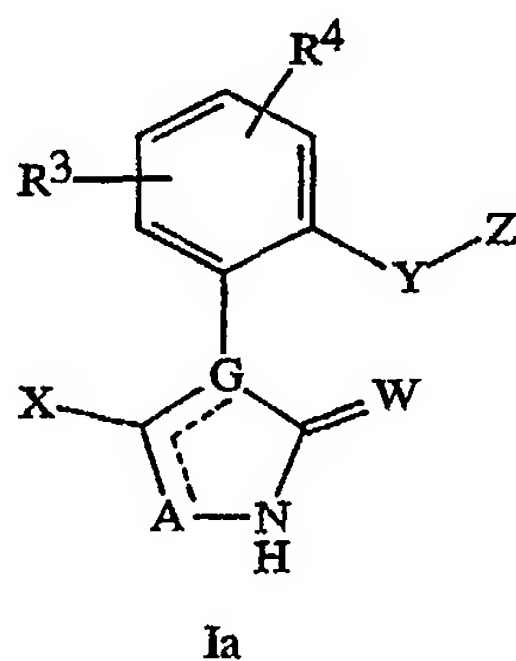
Z is phenyl optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰.

It is recognized that some reagents and reaction conditions described below for preparing compounds of Formula I may not be compatible with some functionalities claimed for R¹, R², R³, R⁴, A, G, W, X, Y, and Z. In these cases, the incorporation of protection/deprotection sequences into the synthesis may be necessary in order to obtain the desired products. The cases in which protecting groups are necessary, and which protecting group to use, will be apparent to one skilled in chemical synthesis.

In the following description of the preparation of compounds of Formula I, compounds denoted as Formula Ia through Ik are various subsets of the compounds of Formula I. All substituents for compounds of Formula Ia through Ik and Formulae 1-39 are as defined above for Formula I except where indicated otherwise.

Compounds of this invention can exist as one or more stereoisomers. The various stereoisomers include enantiomers, diastereomers and geometric isomers. One skilled in the art will appreciate that one stereoisomer may be more active than the others and how to separate said stereoisomers. Accordingly, the present invention comprises mixtures, individual stereoisomers, and optically active mixtures of compounds of Formula I as well as agriculturally suitable salts thereof.

One skilled in the art will recognize that some compounds of Formula I can exist in one or more tautomeric forms. For example, a compound of Formula I wherein R² is H may exist as tautomer Ia or Ib, or both Ia and Ib. The present invention comprises all tautomeric forms of compounds of Formula I.



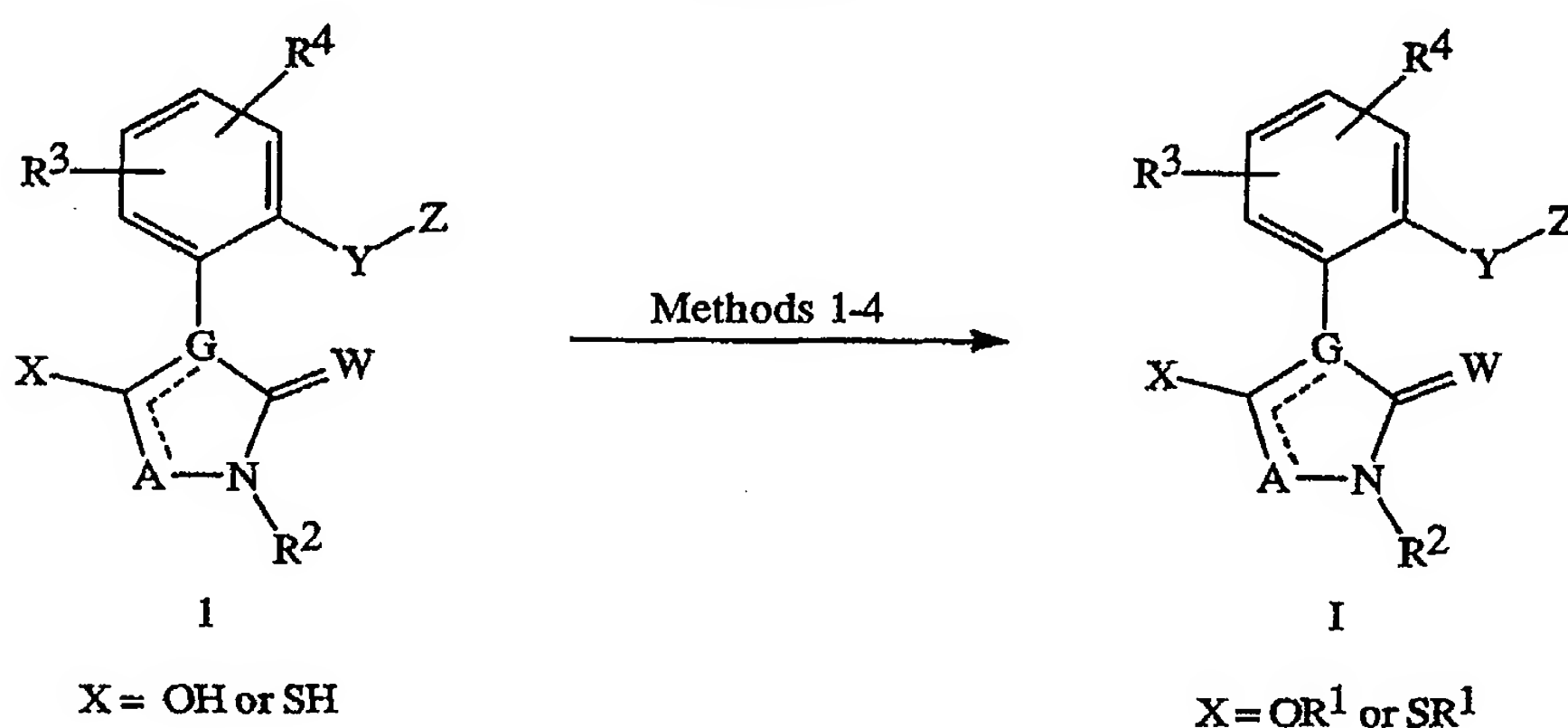
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DETAILED DESCRIPTION OF THE INVENTION

The compounds of Formula I can be prepared as described below in Procedures 1) to 5). Procedures 1) to 4) describe syntheses involving construction of the amide ring after the formation of the aryl moiety. Procedure 5) describes syntheses of the aryl moiety with the amide ring already in place.

1) Alkylation Procedures

The compounds of Formula I are prepared by treating compounds of Formula 1 with an appropriate alkyl transfer reagent in an inert solvent with or without additional acidic or basic reagents or other reagents (Scheme 1). Suitable solvents are selected from the group consisting of polar aprotic solvents such as acetonitrile, dimethylformamide or dimethylsulfoxide; ethers such as tetrahydrofuran, dimethoxyethane, or diethyl ether; ketones such as acetone or 2-butanone; hydrocarbons such as toluene or benzene; and halocarbons such as dichloromethane or chloroform.

Scheme 1

Method 1: $Q-CH=N_2$ (Q = H or $(CH_3)_3Si$)

2

Method 2: $Cl_3C-C(=NH)OR^1$; Lewis acid

3

Method 3: $(R^1)_3O^+ BF_4^-$

4

Method 4: $(R^1)_2SO_4$; R^1OSO_2Q ; or R^1-hal ;
optional base

(hal = F, Cl, Br, or I)

(Q = C₁-C₆ alkyl, C₁-C₆ haloalkyl)

10

For example, compounds of Formula I can be prepared by the action of diazoalkane reagents of Formula 2 such as diazomethane (Q = H) or trimethylsilyldiazomethane (Q = $(CH_3)_3Si$) on compounds of dicarbonyl compounds of Formula 1 (Method 1). Use of trimethylsilyldiazomethane requires a protic cosolvent such as methanol. For examples of these procedures, see *Chem. Pharm. Bull.*, (1984), 32, 3759.

15

As indicated in Method 2, compounds of Formula I can also be prepared by contacting carbonyl compounds of Formula 1 with alkyl trichloroacetimidates of Formula 3 and a Lewis acid catalyst. Suitable Lewis acids include trimethylsilyl triflate and tetrafluoroboric acid. The alkyl trichloroacetimidates can be prepared from the appropriate alcohol and trichloroacetonitrile as described in the literature (J. Danklmaier and H. Hönig, *Synth. Commun.*, (1990), 20, 203).

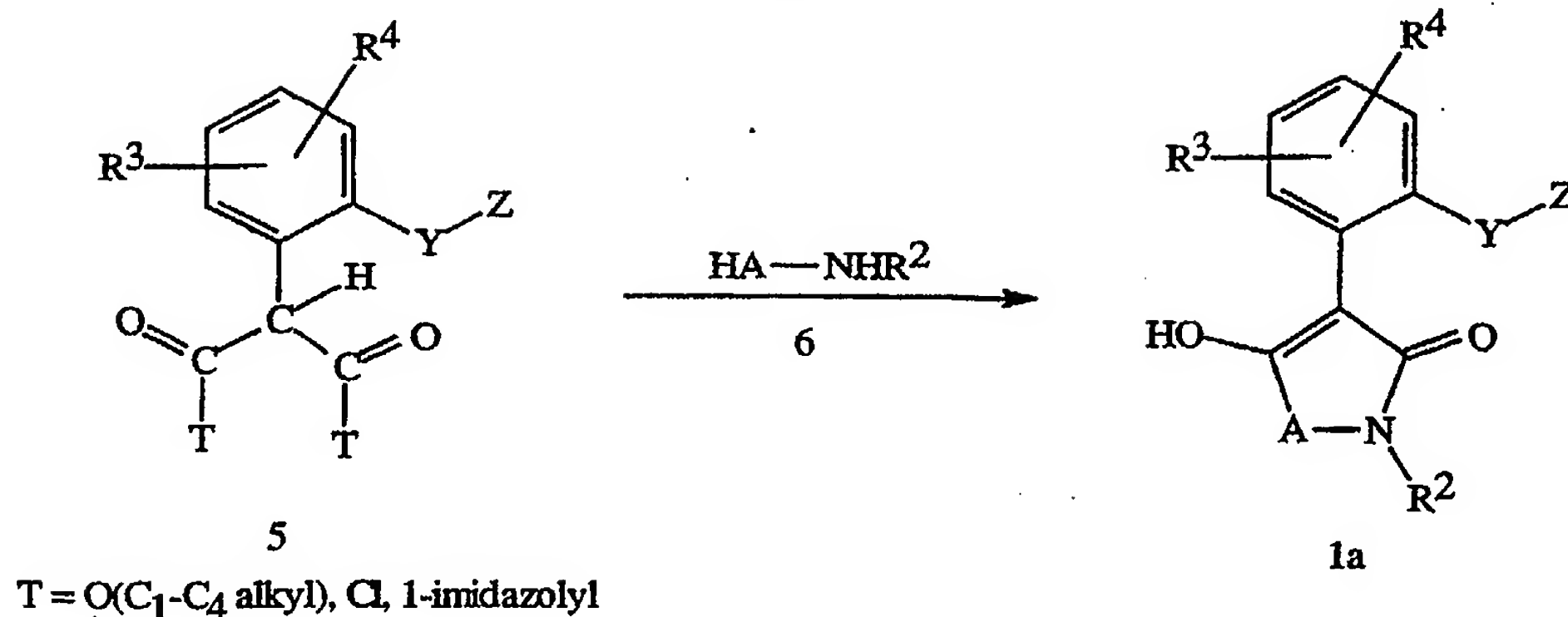
Compounds of Formula I can also be prepared from compounds of Formula 1 by treatment with a trialkyloxonium tetrafluoroborate (i.e., Meerwein's salt) of Formula 4 (Method 3). The use of trialkyloxonium salts as powerful alkylating agents is well known in the art (see U. Schöllkopf, U. Groth, C. Deng, *Angew. Chem., Int. Ed. Engl.*, (1981), 20, 798).

Other alkylating agents which can convert carbonyl compounds of Formula 1 to compounds of Formula I are dialkyl sulfates such as dimethyl sulfate, haloalkyl sulfonates such as methyl trifluoromethanesulfonate, and alkyl halides such as iodomethane and propargyl bromide (Method 4). These alkylations can be conducted with or without additional base. Appropriate bases include alkali metal alkoxides such as potassium *tert*-butoxide, inorganic bases such as sodium hydride and potassium carbonate, or tertiary amines such as triethylamine, pyridine, 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU), and triethylenediamine. See R. E. Benson, T. L. Cairns, *J. Am. Chem. Soc.*, (1948), 70, 2115 for alkylation examples using agents of this type.

Compounds of Formula 1a (compounds of Formula 1 wherein G = C, W = O and X = OH) can be prepared by condensation of malonates or malonate derivatives of Formula 5 with an ambident nucleophile of Formula 6 (Scheme 2). The nucleophiles of Formula 6 are *N*-substituted hydroxylamines (HO-NHR²) and substituted hydrazines (HN(R⁵)-NHR²). Examples of such nucleophiles are *N*-methylhydroxylamine and methylhydrazine. The preparation of the malonate esters of Formula 5 can be prepared by methods described hereinafter. The esters of Formula 5 can also be activated by first hydrolyzing the ester to form the corresponding carboxylic acid, and then converting the acid into the acid chloride (T = Cl) using thionyl chloride or oxalyl chloride, or into the acyl imidazole (T = 1-imidazolyl) by treating with 1,1'-carbonyldiimidazole.

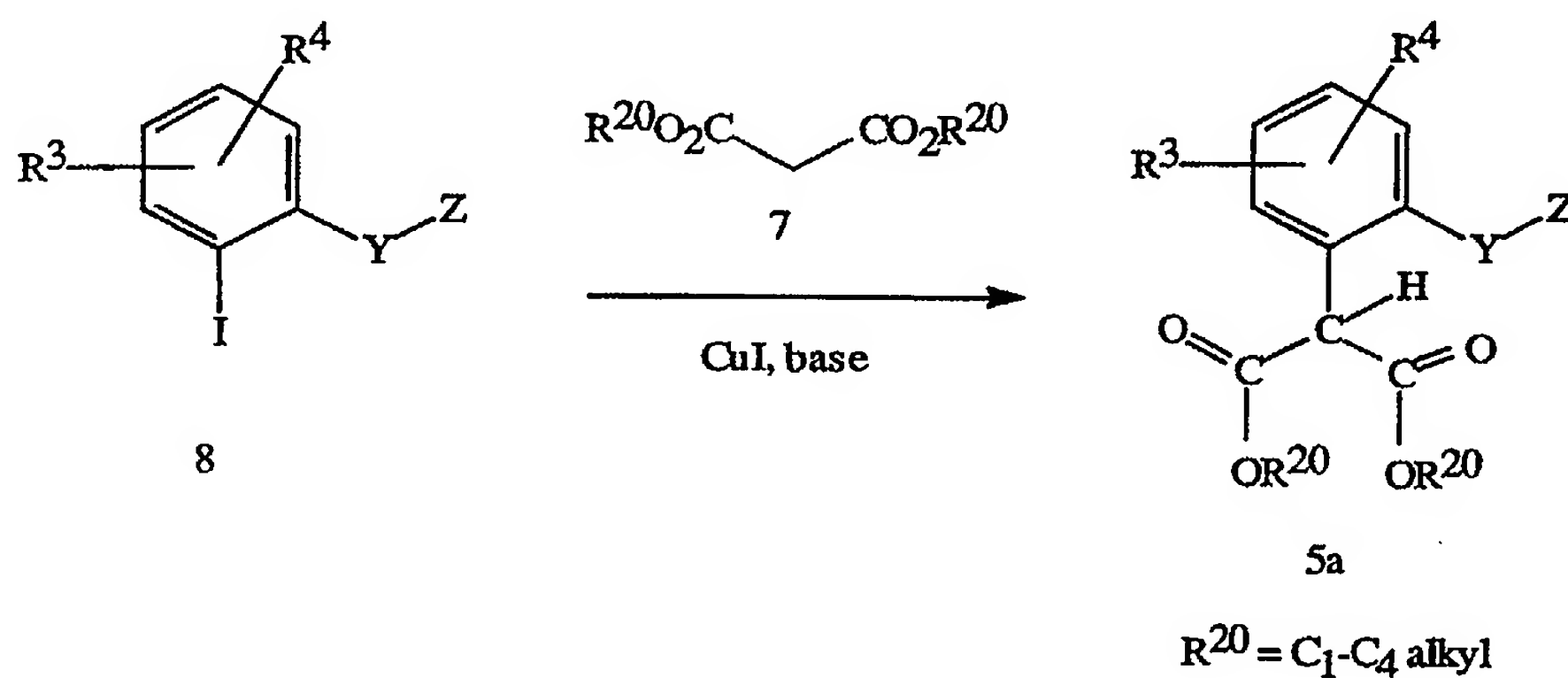
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Scheme 2



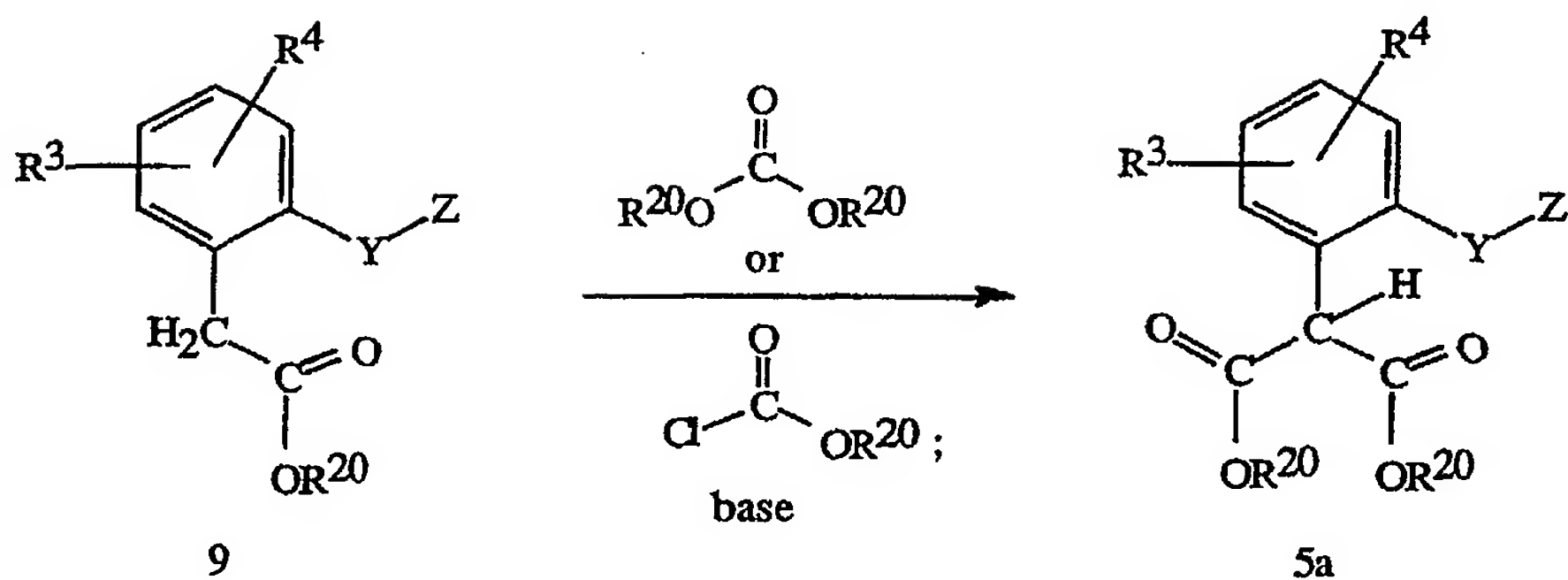
5 Esters of Formula 5a can be prepared from copper (I)-catalyzed reaction of malonate esters of Formula 7 with substituted iodobenzenes of Formula 8 according to methods adapted from A. Osuka, T. Kobayashi and H. Suzuki, *Synthesis*, (1983), 67, and illustrated in Scheme 3.

Scheme 3

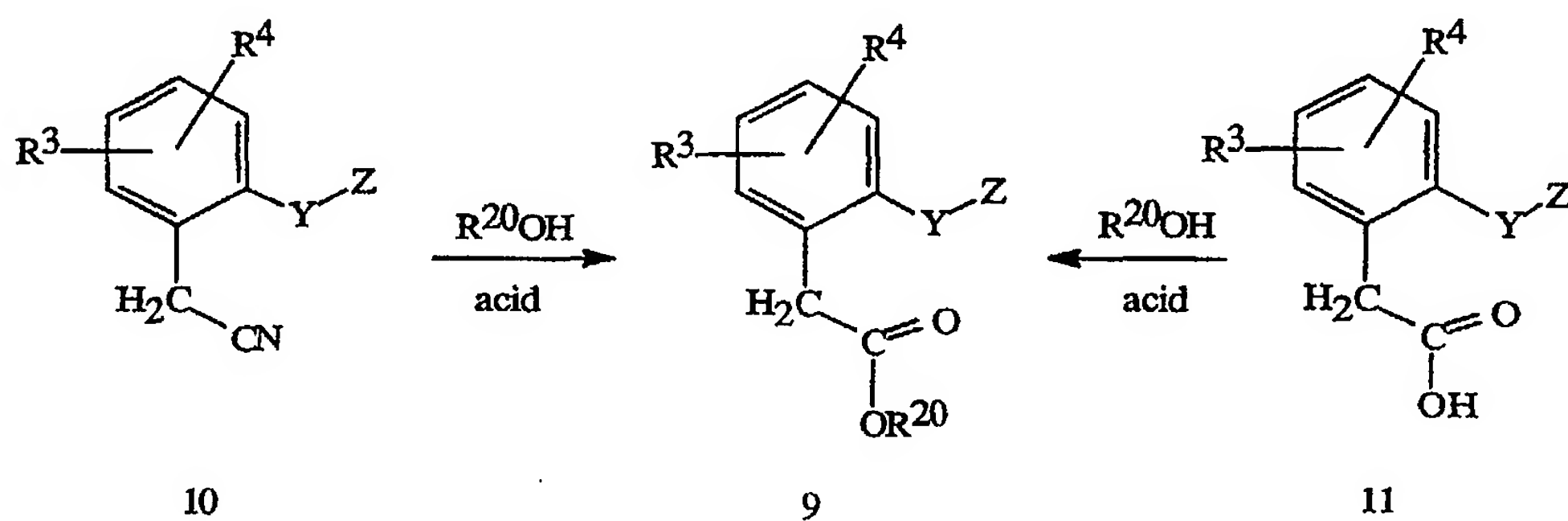


10 Additionally, the malonate esters of Formula 5a can be prepared by treating phenyl acetic acid esters of Formula 9 with a dialkyl carbonate or alkyl chloroformate in the presence of a suitable base such as, but not limited to, sodium metal and sodium hydride (Scheme 4). For example, see *J. Am. Chem. Soc.*, (1928), 50, 2758.

15

Scheme 4 $\text{R}^{20} = \text{C}_1\text{-C}_4 \text{ alkyl}$

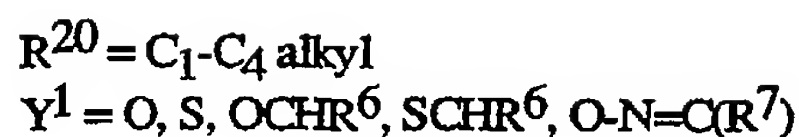
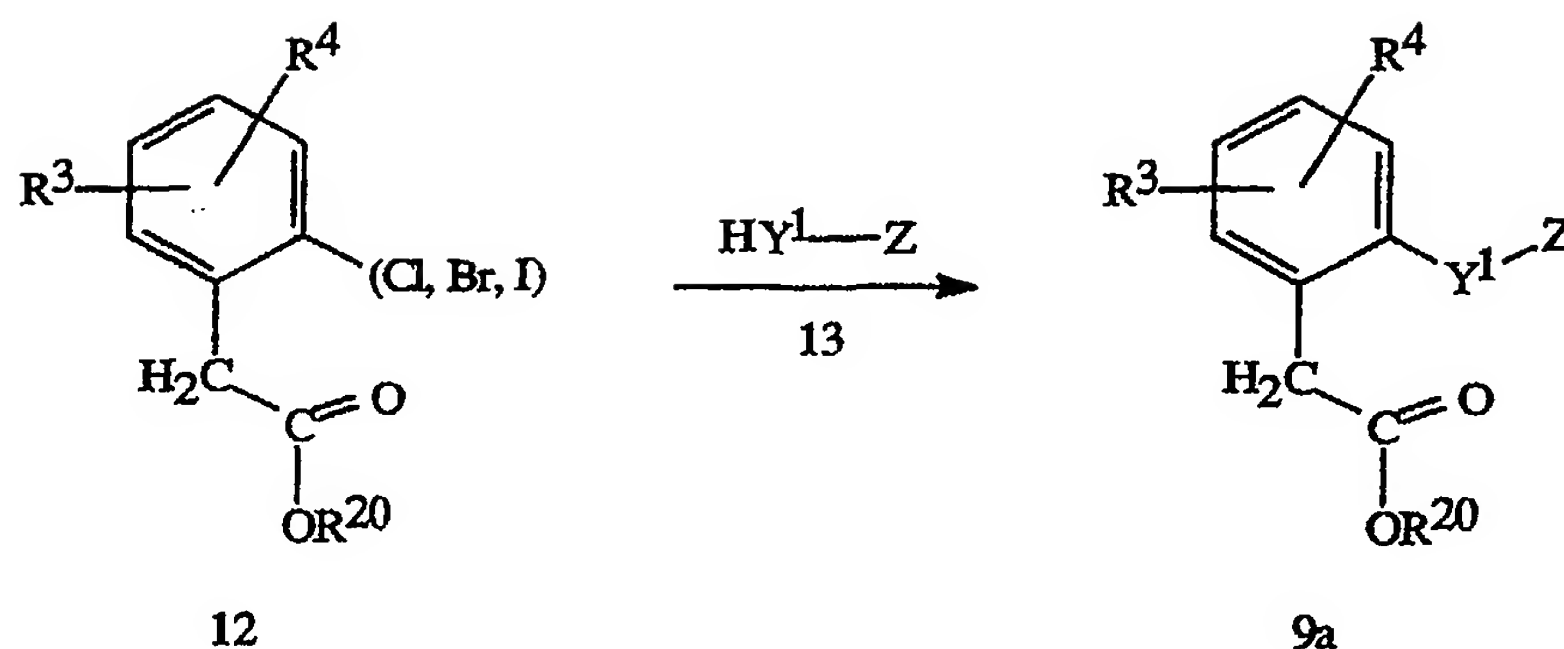
5 Esters of Formula 9 can be prepared from acid-catalyzed alcoholysis of phenyl acetonitriles of Formula 10 or esterification of phenyl acetic acids of Formula 11 as illustrated in Scheme 5 (see *Org. Synth.*, Coll. Vol. I, (1941), 270).

Scheme 5 $\text{R}^{20} = \text{C}_1\text{-C}_4 \text{ alkyl}$

10 Phenyl acetic acid esters of Formula 9a can also be prepared by copper (I)-catalyzed condensation of phenyl halides of Formula 12 with compounds of Formula 13 as described in EP-A-307,103 and illustrated below in Scheme 6.

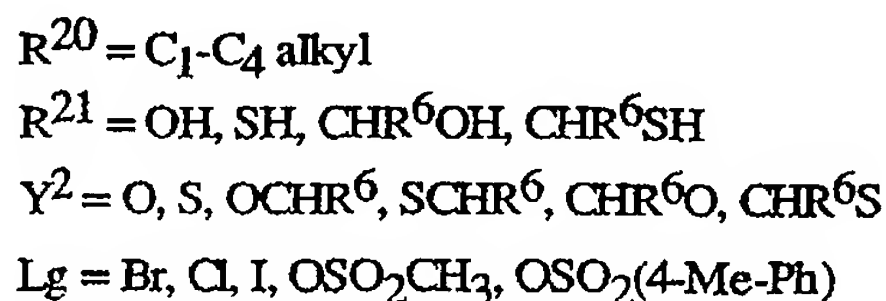
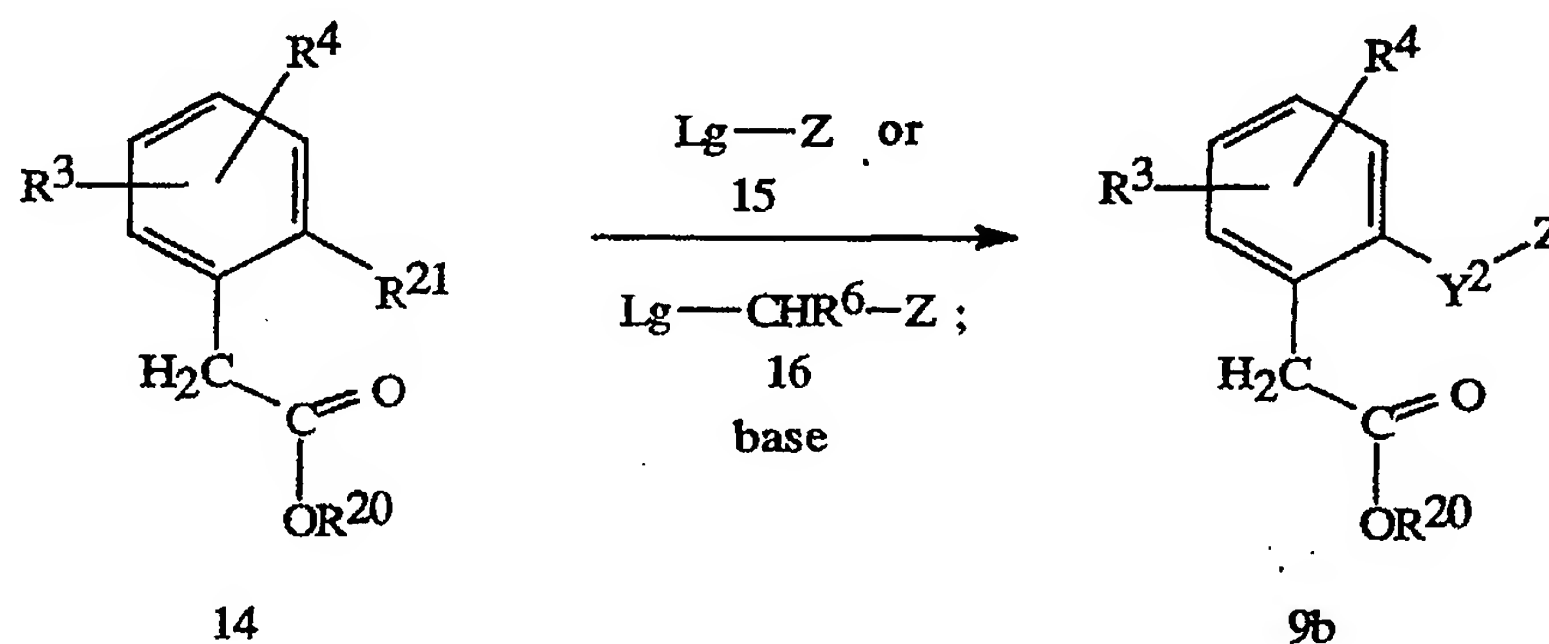
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Scheme 6



Some esters of Formula 9 (Formula 9b) can also be prepared by forming the Y² bridge using conventional nucleophilic substitution chemistry (Scheme 7). Displacement of an appropriate leaving group (Lg) in electrophiles of Formula 15 or 16 with a nucleophilic ester of Formula 14 affords compounds of Formula 9b. A base, for example sodium hydride, is used to generate the corresponding alkoxide or thioalkoxide of the compound of Formula 14.

Scheme 7



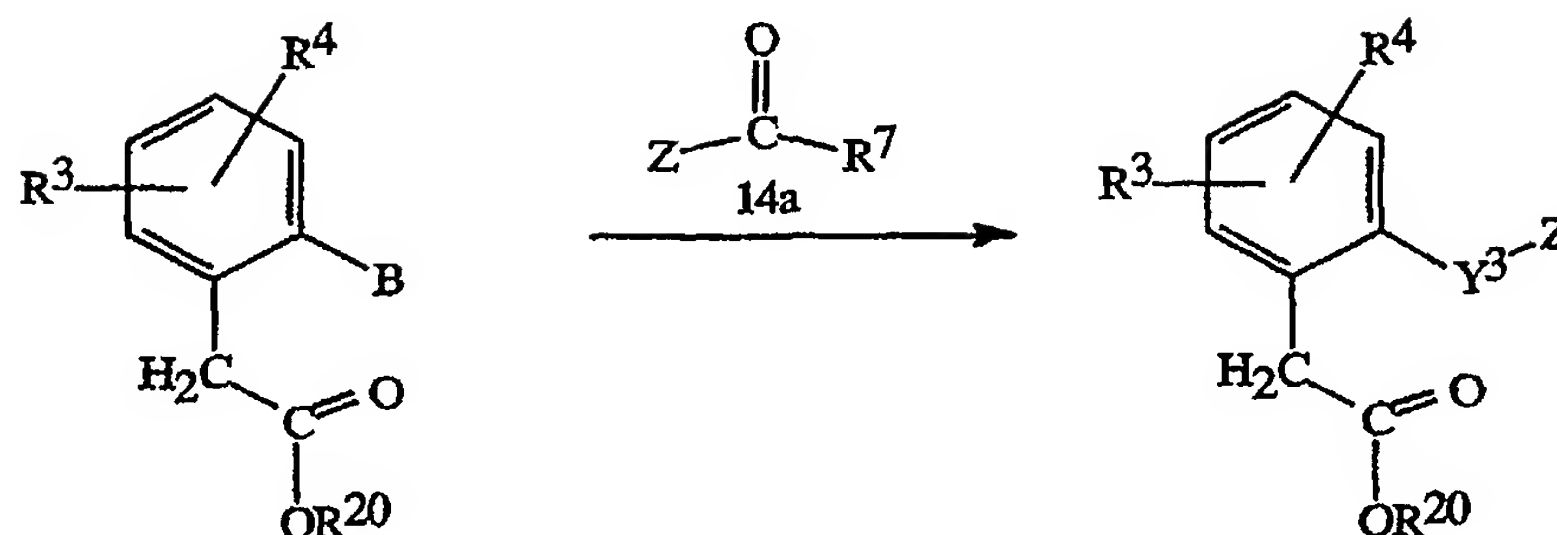
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Some esters of Formula 9 (Formula 9e) can also be prepared by forming the Y³ bridge from substituted hydroxylamine 9d and carbonyl compounds 14a. The hydroxylamine 9d is in turn prepared from esters 9c. This method has been described in EP-600,835 and illustrated in Scheme 8.

15

17

Scheme 8

9c B = CHR⁶Br9d B = CHR⁶ONH₂ HClR²⁰ = C₁-C₄ alkylY³ = CHR⁶ON=C(R⁷)

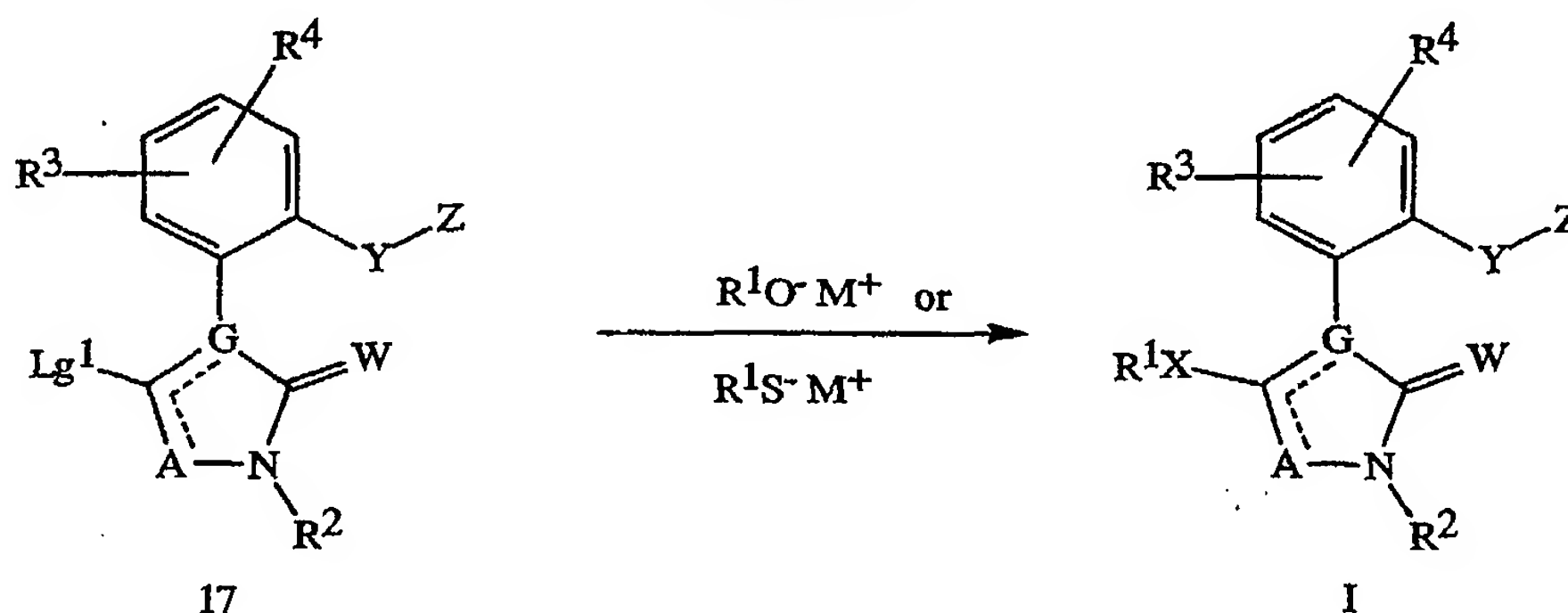
9e

2) Displacement and Conjugate Addition/Elimination Procedures

- Compounds of Formula I can also be prepared by reaction of Formula 17 compounds with alkali metal alkoxides (R¹O⁻M⁺) or alkali metal thioalkoxides (R¹S⁻M⁺) in a suitable solvent (Scheme 9). The leaving group Lg¹ in the amides of Formula 17 are any group known in the art to undergo a displacement reaction of this type. Examples of suitable leaving groups include chlorine, bromine, and sulfonyl and sulfonate groups. Examples of suitable inert solvents are dimethylformamide or dimethylsulfoxide.

10

Scheme 9

Lg¹ = Cl, Br, -SO₂Q, or -OSO₂QQ = C₁-C₆ alkyl or C₁-C₆ haloalkyl

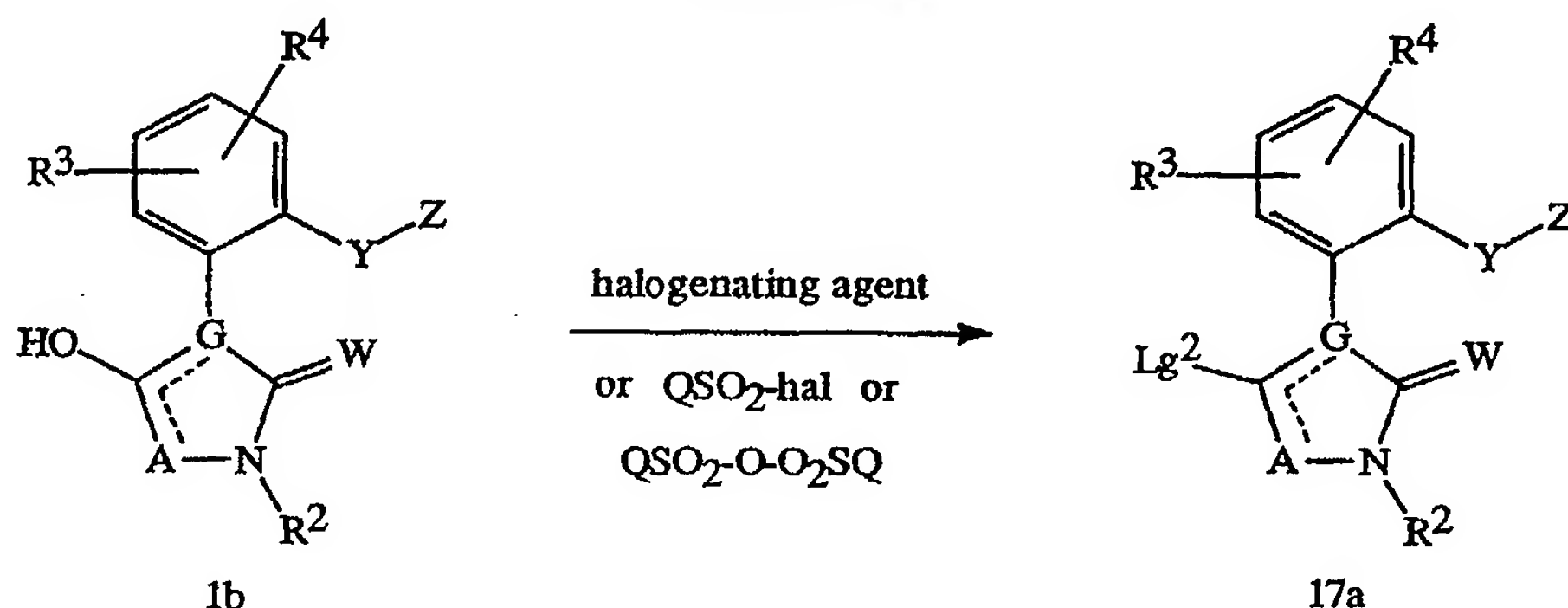
M = K or Na

- Compounds of Formula 17a can be prepared from compounds of Formula 1b (compounds of Formula 1 wherein X is OH) by reaction with halogenating agents such as thionyl chloride or phosphorus oxybromide to form the corresponding β-halo-substituted derivatives (Scheme 10). Alternatively, compounds of Formula 1b can be treated with an alkylsulfonyl halide or haloalkylsulfonyl anhydride, such as

methane sulfonyl chloride, *p*-toluenesulfonyl chloride, and trifluoromethanesulfonyl anhydride, to form the corresponding β -alkylsulfonate of Formula 17a. The reaction with the sulfonyl halides may be performed in the presence of a suitable base (e.g., triethylamine).

5

Scheme 10



$\text{Lg}^2 = \text{Cl, Br, or -OSO}_2\text{Q}$

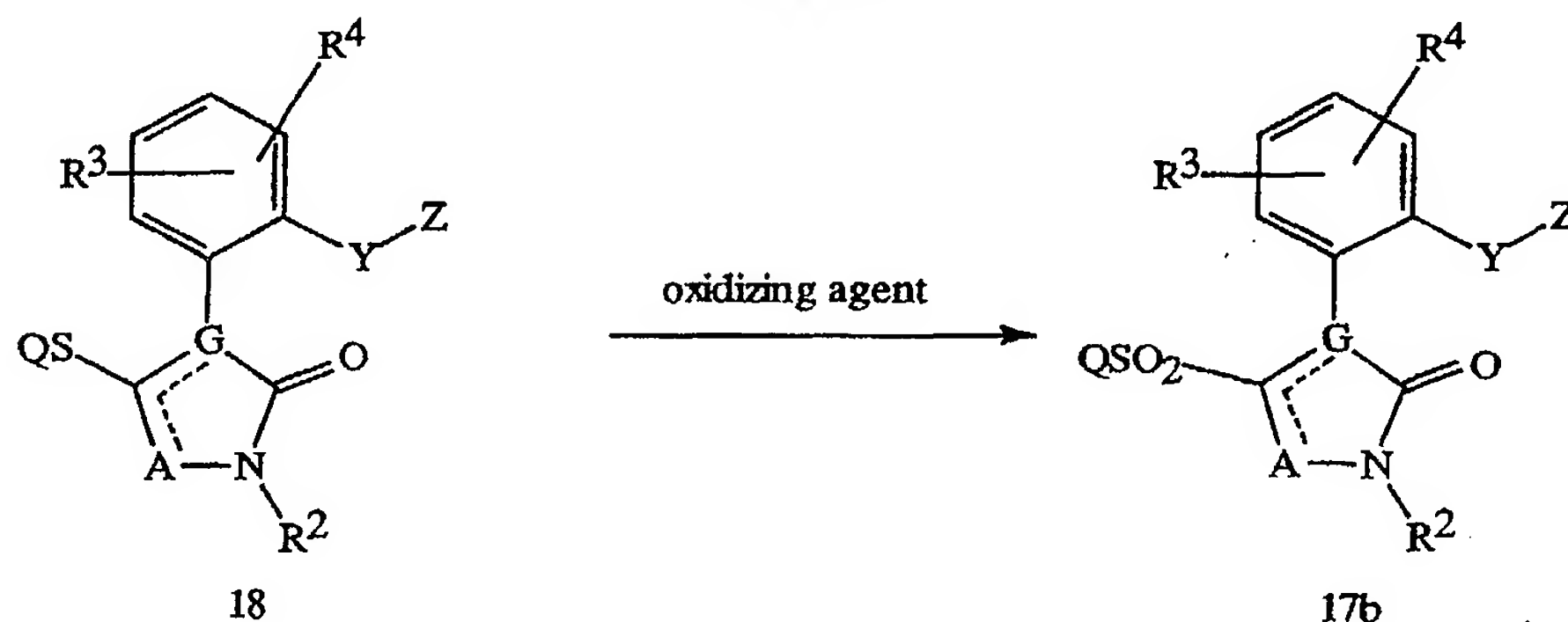
$\text{Q} = \text{C}_1\text{-C}_6 \text{ alkyl or C}_1\text{-C}_6 \text{ haloalkyl}$

$\text{hal} = \text{Br, Cl or F}$

As illustrated in Scheme 11, sulfonyl compounds of Formula 17b can be prepared by oxidation of the corresponding thio compound of Formula 18 using well-known methods for the oxidation of sulfur (see Schrenk, K. In *The Chemistry of Sulphones and Sulphoxides*; Patai, S. et al., Eds.; Wiley: New York, 1988). Suitable oxidizing reagents include meta-chloro-peroxybenzoic acid, hydrogen peroxide and Oxone[®] (KHSO₅).

10

Scheme 11



$\text{Q} = \text{C}_1\text{-C}_6 \text{ alkyl or C}_1\text{-C}_6 \text{ haloalkyl}$

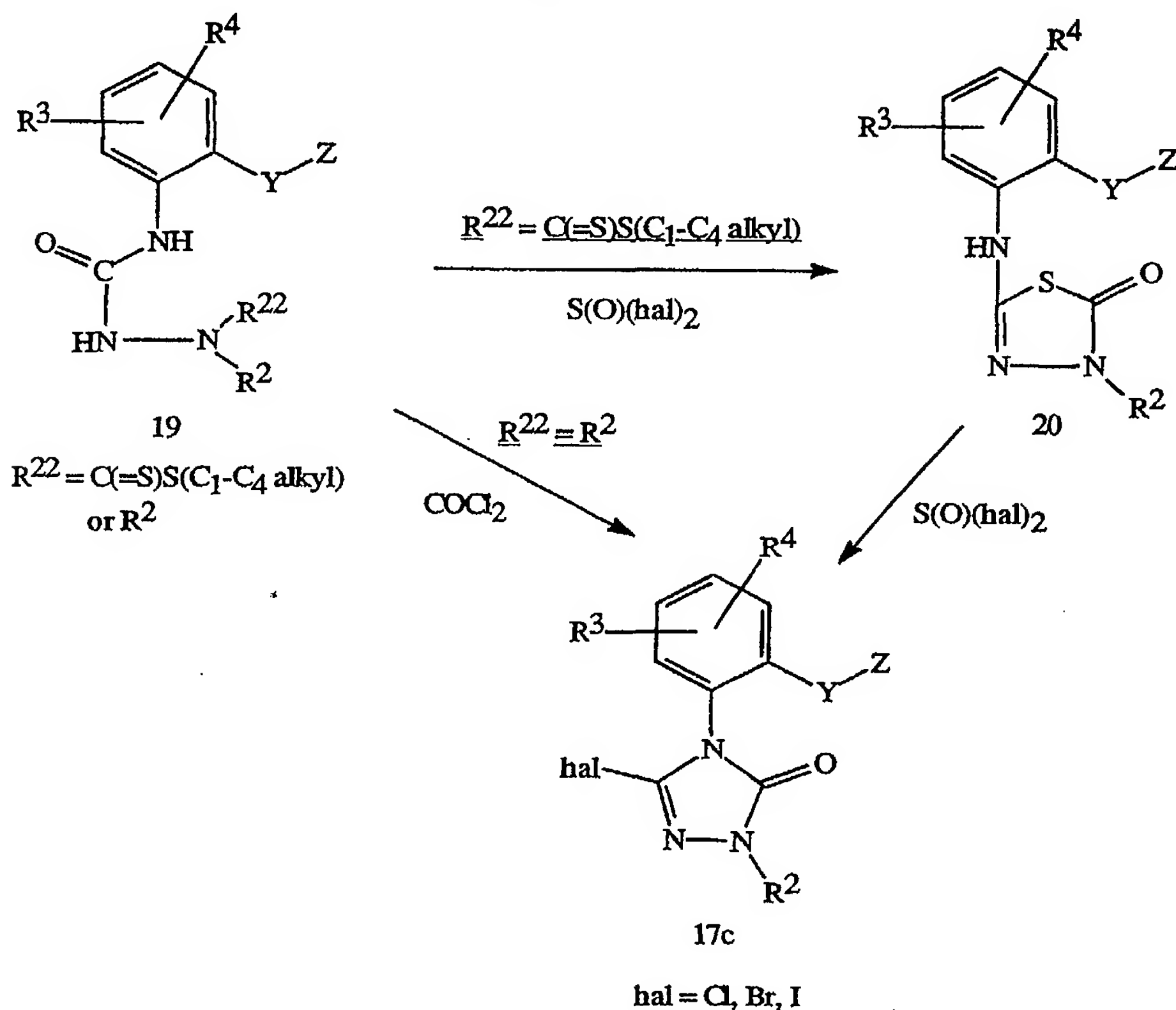
Alternatively, halo-compounds of Formula 17c (compounds of Formula 17a wherein A = N, G = N, and W = O) can be prepared from hydrazides of Formula 19 as illustrated in Scheme 12. When $\text{R}^{22} = \text{C}(=\text{S})\text{S}(\text{C}_1\text{-C}_4 \text{ alkyl})$, the diacyl compound of Formula 19 is treated with excess thionyl halide, for example excess thionyl chloride.

15

The product formed first is the ring-closed compound of Formula 20 which can be isolated or converted *in situ* to the compound of Formula 17c; see P. Molina, A. Tárraga, A. Espinosa, *Synthesis*, (1989), 923 for a description of this process.

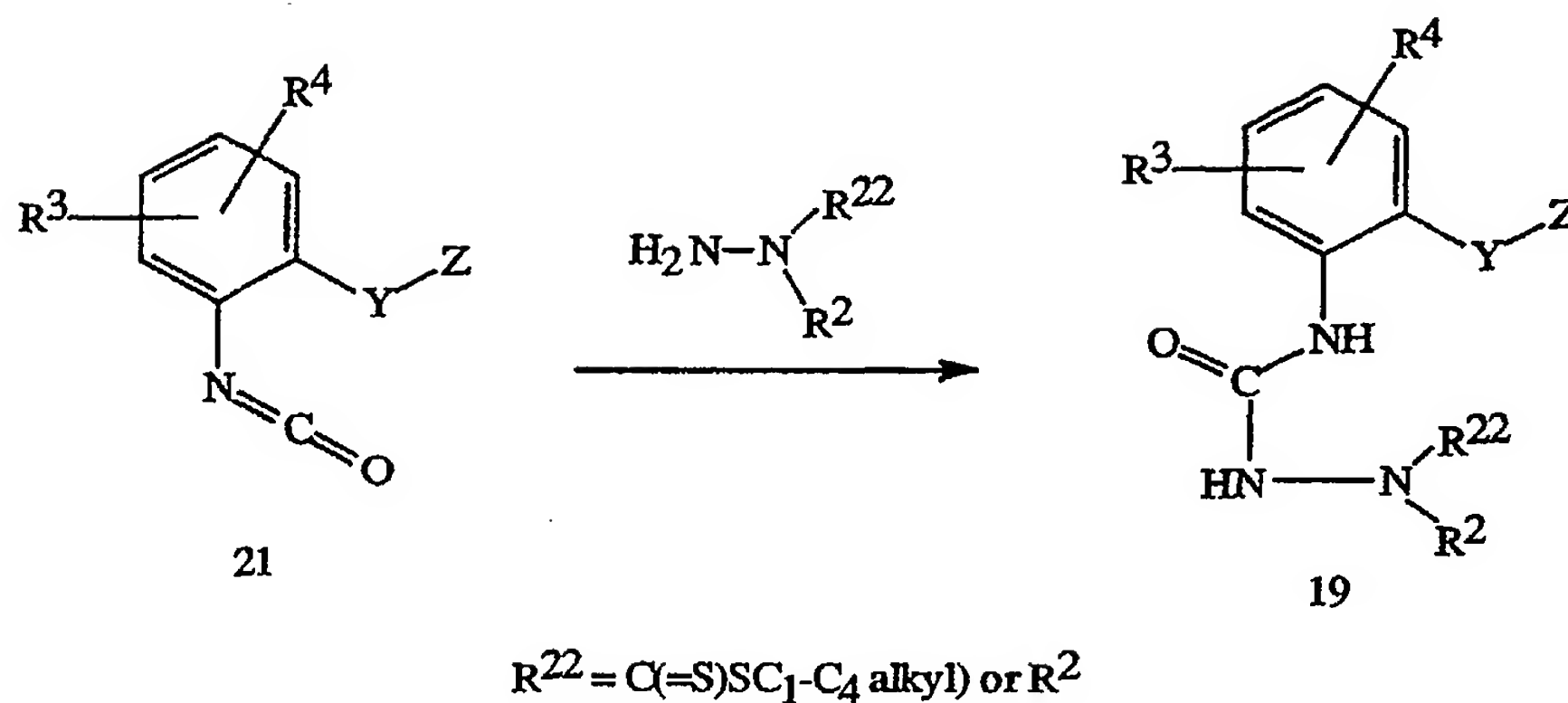
- 5 Alternatively, when $R^{22} = R^2$ as defined above, the hydrazide of Formula 19 is cyclized with phosgene to form the cyclic urea of Formula 17c wherein $\text{hal} = \text{Cl}$. This procedure is described in detail in *J. Org. Chem.*, (1989), 54, 1048.

Scheme 12

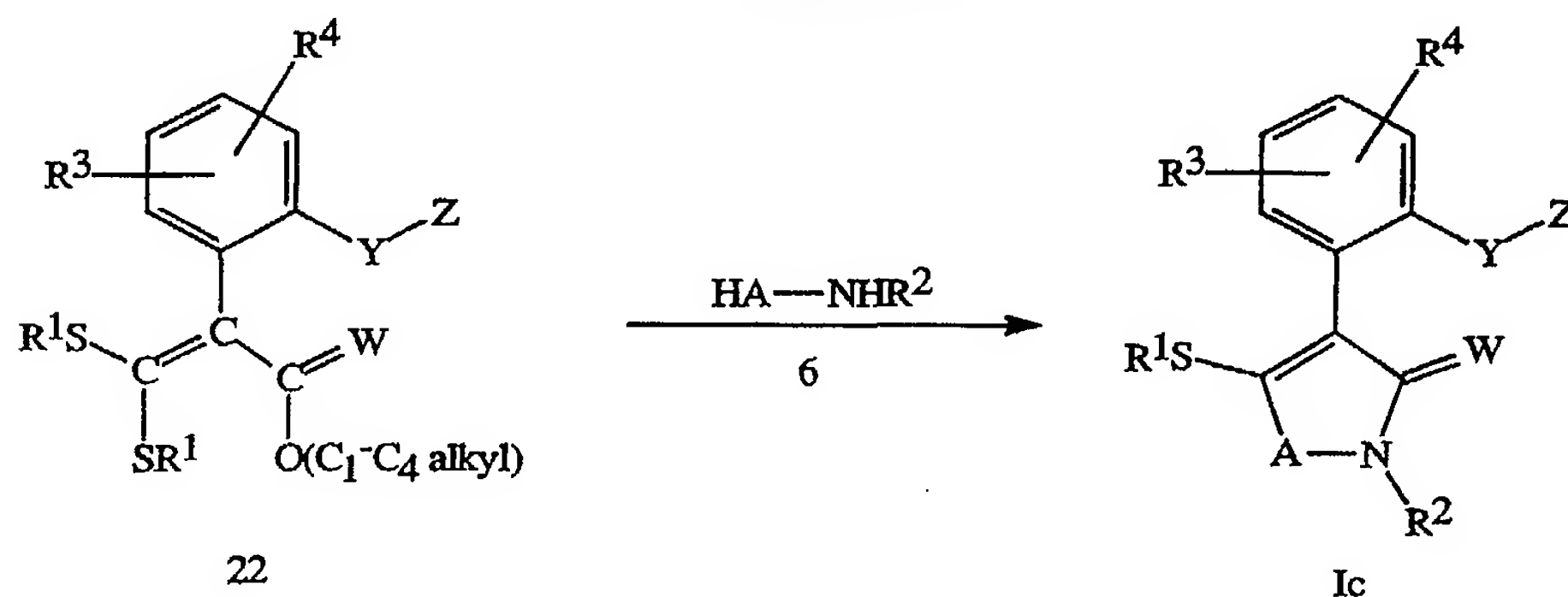


- 10 The hydrazides of Formula 19 can be prepared as illustrated in Scheme 13. Condensation of the isocyanate of Formula 21 with the hydrazine of Formula $\text{H}_2\text{NNR}^2\text{R}^{22}$ in an inert solvent such as tetrahydrofuran affords the hydrazide.

20

Scheme 133) Conjugate Addition/Cyclization Procedures

- In addition to the methods disclosed above, compounds of Formula I wherein
- 5 $X = SR^1$ and $G = C$ (Formula Ic) can be prepared by treating a ketenedithioacetal of Formula 22 with an ambident nucleophile of Formula 6 (Scheme 14). The nucleophiles of Formula 6 are described above.

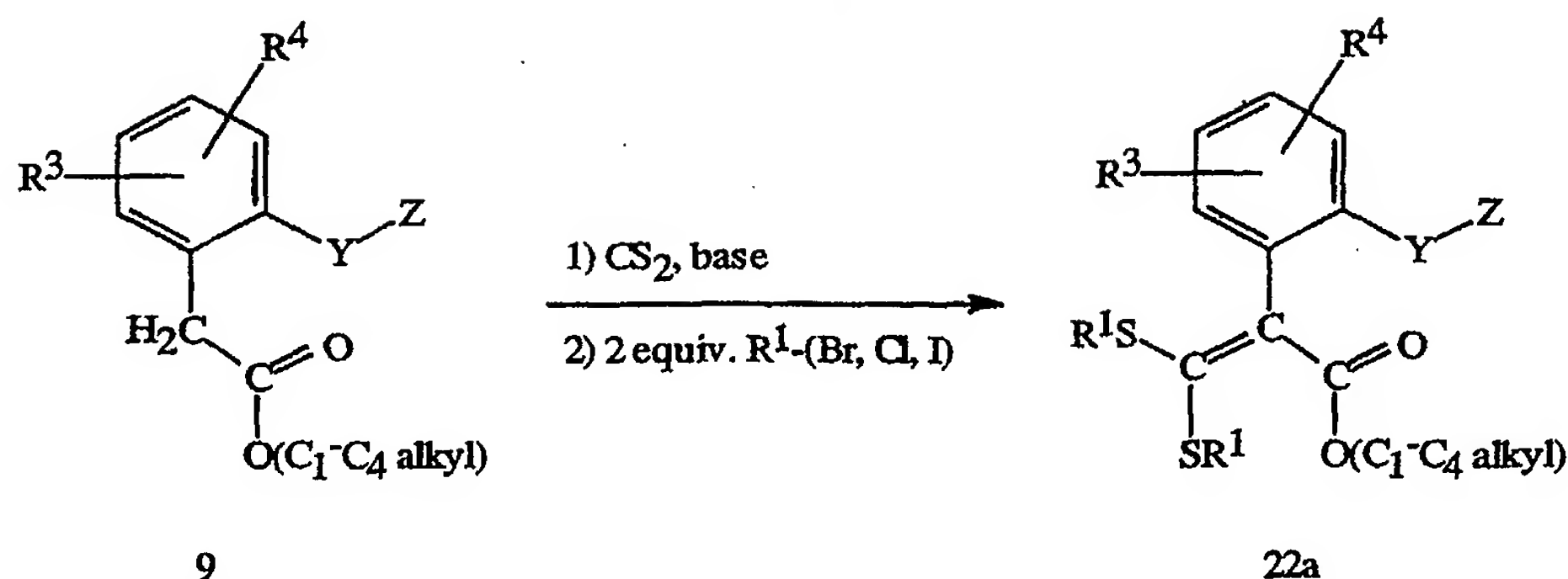
Scheme 14

10

Ketene dithioacetals of Formula 22a can be prepared by condensing phenyl acetic acid esters of Formula 9 with carbon disulfide in the presence of a suitable base, followed by reaction with two equivalents of an R^1 -halide, such as iodomethane or propargyl bromide (Scheme 15).

21

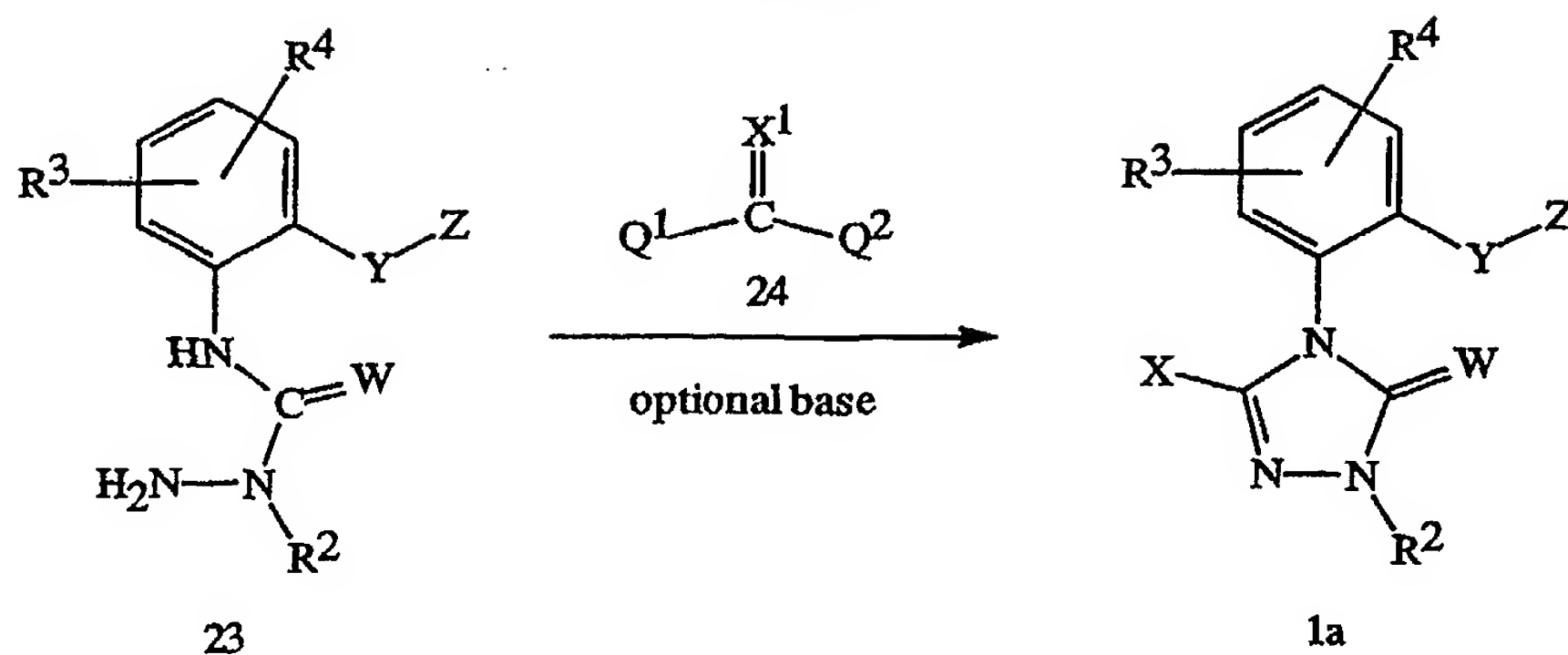
Scheme 15



- Compounds of Formula 1a (compounds of Formula 1 wherein A = N, G = N) can be prepared by condensation of *N*-amino-ureas of Formula 23 with a carbonylating agent of Formula 24 (Scheme 16). The carbonylating agents of Formula 24 are carbonyl or thiocarbonyl transfer reagents such as phosgene, thiophosgene, diphosgene (ClC(=O)OCCl₃), triphosgene (Cl₃COC(=O)OCCl₃), *N,N'*-carbonyldiimidazole, *N,N'*-thiocarbonyldiimidazole, and 1,1'-carbonyldi(1,2,4-triazole). Alternatively, the compounds of Formula 24 can be alkyl chloroformates or dialkyl carbonates. Some of these carbonylating reactions may require the addition of a base to effect reaction.
- Appropriate bases include alkali metal alkoxides such as potassium *tert*-butoxide, inorganic bases such as sodium hydride and potassium carbonate, or tertiary amines such as triethylamine, pyridine, 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU), or triethylenediamine. Suitable solvents include polar aprotic solvents such as acetonitrile, dimethylformamide, or dimethylsulfoxide; ethers such as tetrahydrofuran, dimethoxyethane, or diethyl ether; ketones such as acetone or 2-butanone; hydrocarbons such as toluene or benzene; or halocarbons such as dichloromethane or chloroform. The reaction temperature can vary between 0°C and 150°C and the reaction time can be from 1 to 72 hours depending on the choice of base, solvent, temperature, and substrates.

22

Scheme 16



Q¹ and Q² are independently Cl, OCCl₃, O(C₁-C₄ alkyl), 1-imidazolyl, 1,2,4-triazolyl

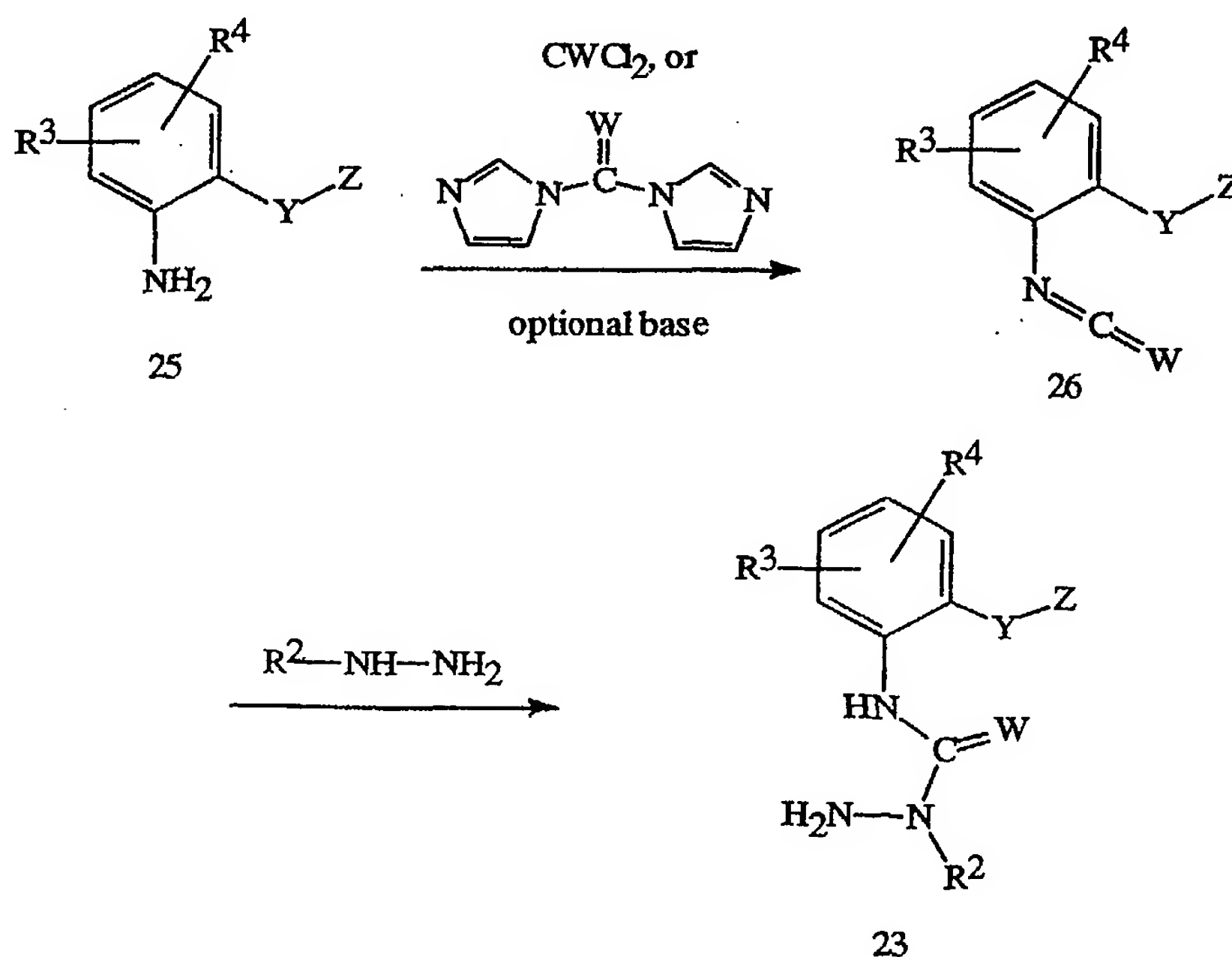
X = OH or SH

X¹ = O or S

N-Amino-ureas of Formula 23 can be prepared as illustrated in Scheme 17.

- 5 Treatment of an aniline of Formula 25 with phosgene, thiophosgene, *N,N'*-carbonyldiimidazole, or *N,N'*-thiocarbonyldiimidazole produces the isocyanate or isothiocyanate of Formula 26. A base can be added for reactions with phosgene or thiophosgene. Subsequent treatment of the iso(thio)cyanate with an R²-substituted hydrazine produces the *N*-amino-urea of Formula 23.

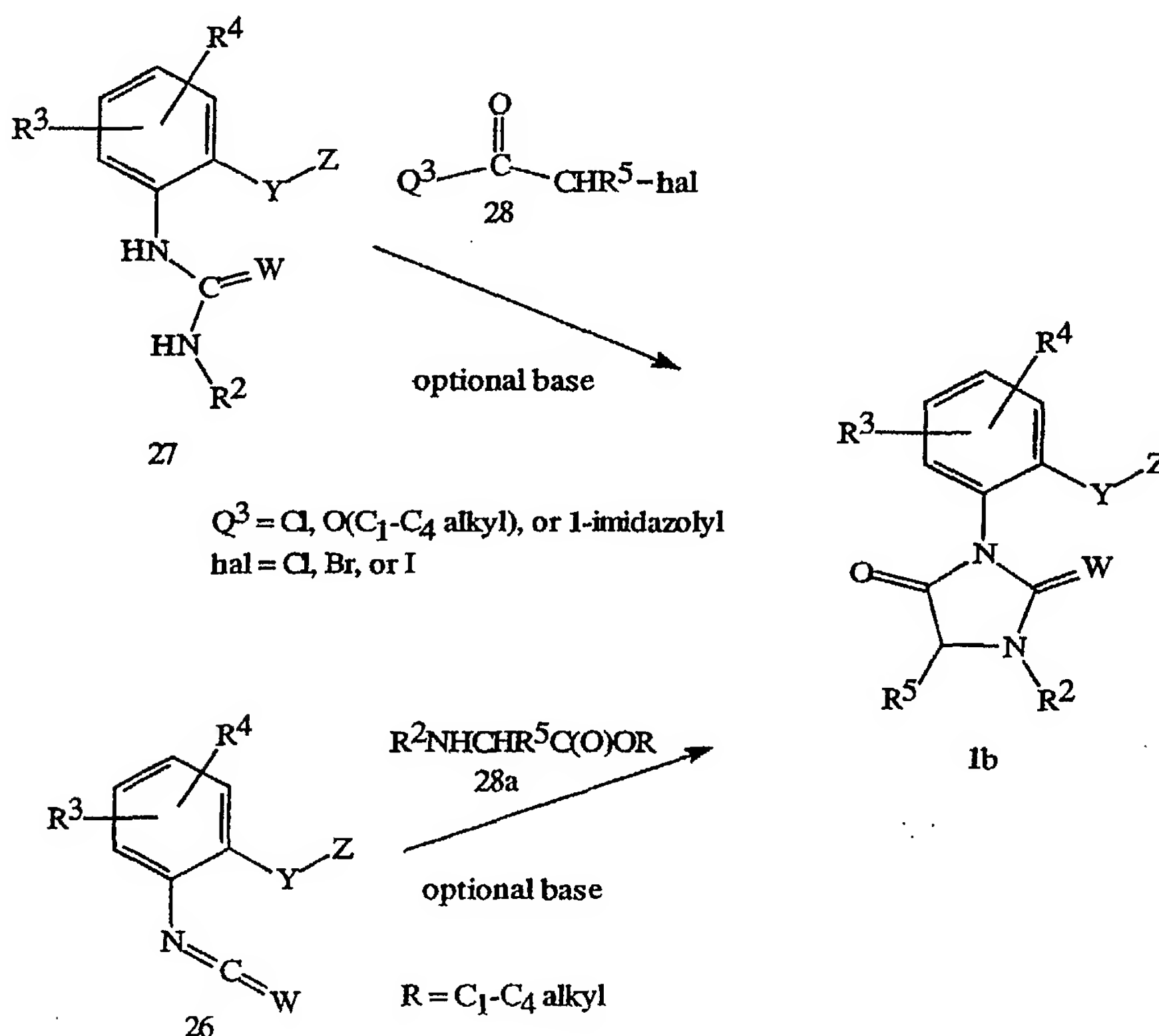
Scheme 17



Compounds of Formula 1b (compounds of Formula 1 wherein A = CR⁵, G = N, and X = O) can be prepared by either method illustrated in Scheme 18. Ureas of Formula 27 are reacted with activated 2-halocarboxylic acid derivatives such as 2-halocarboxylic acid chlorides, 2-halocarboxylic acid esters or 2-haloacyl imidazoles.

- 5 The initial acylation on the aniline nitrogen is followed by an intramolecular displacement of the 2-halo group to effect cyclization. Base may be added to accelerate the acylation and/or the subsequent cyclization. Suitable bases include triethylamine and sodium hydride. Alternatively, Formula 1b compounds can be prepared by reaction of Formula 26 isocyanates with Formula 28a esters. As described above, base may be added to
- 10 accelerate the reaction and subsequent cyclization to Formula 1b compounds.

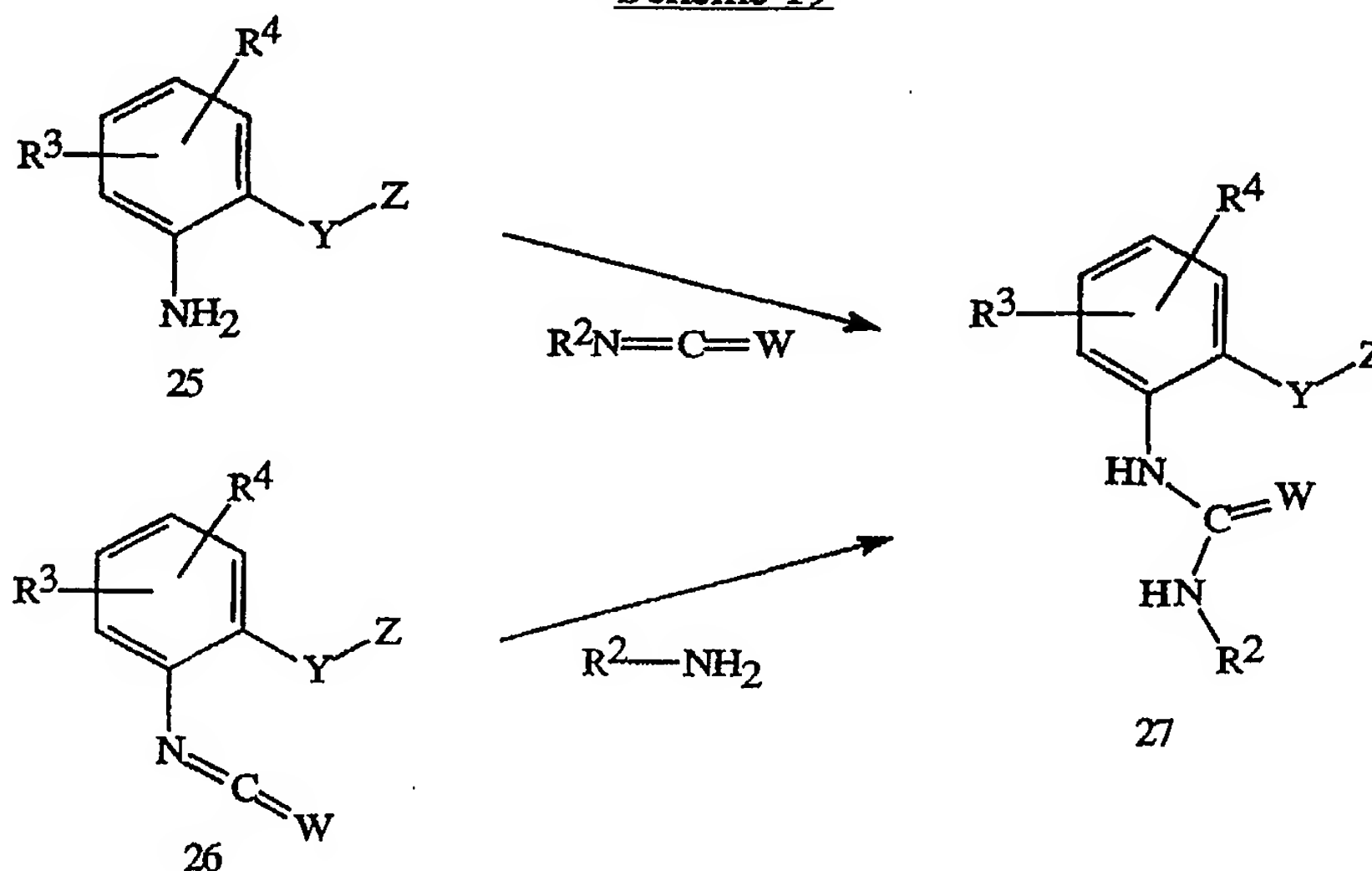
Scheme 18



- The ureas of Formula 27 can be prepared by either of the methods illustrated in Scheme 19. The anilines of Formula 25 can be contacted with an isocyanate or isothiocyanate of Formula R²N=C=W as described above. Alternatively, an isocyanate or isothiocyanate of Formula 26 can be condensed with an amine of Formula R²-NH₂ to form the urea. The anilines and iso(thio)cyanates of Formulae 25 and 26, respectively, are commercially available or prepared by well-known methods. For example, isothiocyanates can be prepared by methods described in *J. Heterocycl. Chem.*, (1990),
- 15

27, 407. Isocyanates can be prepared as described in March, J. *Advanced Organic Chemistry*; 3rd ed., John Wiley: New York, (1985), pp 944, 1166.

Scheme 19



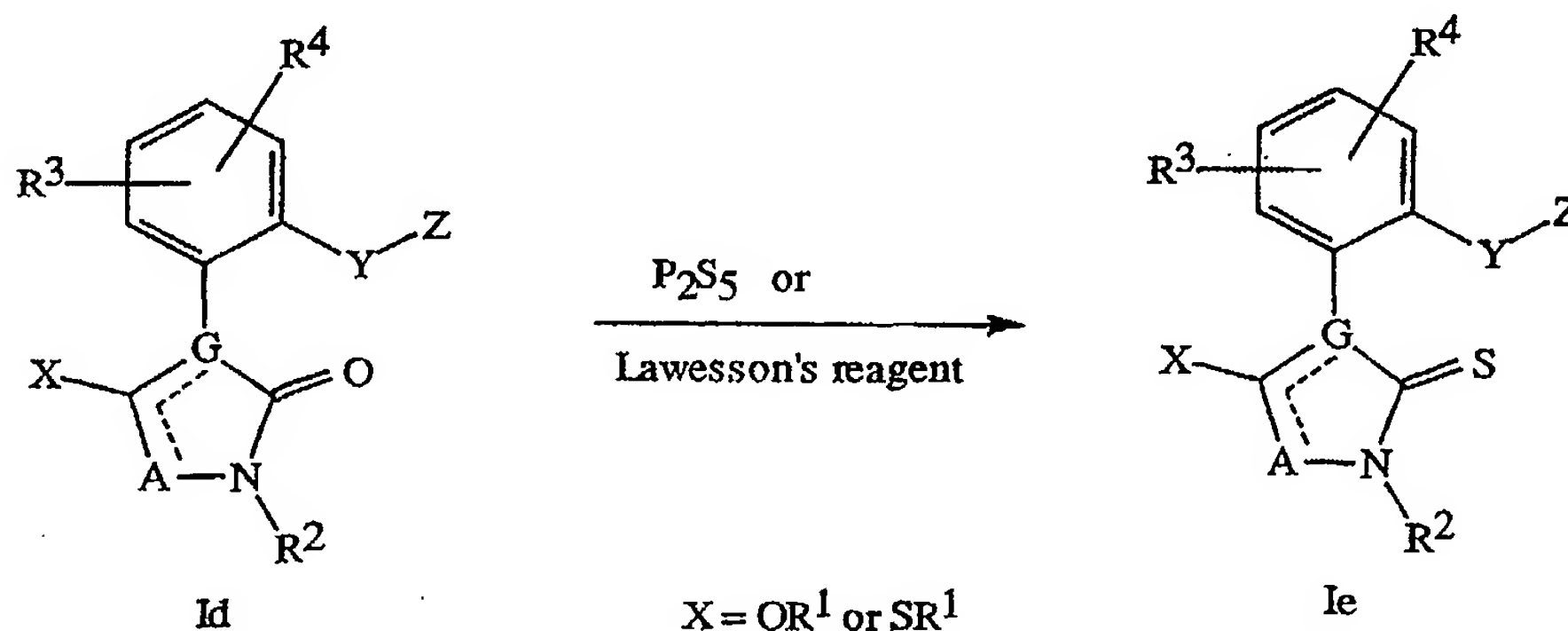
5

4) Thionation Procedures

Compounds of Formula Ie, compounds of Formula I wherein W = S, can be prepared by treating compounds of Formula Id (I wherein W = O) with thionating reagents such as P₂S₅ or Lawesson's reagent [2,4-bis(4-methoxyphenyl)-1,3-dithia-2,4-diphosphetane-2,4-disulfide] as illustrated in Scheme 20 (see *Bull. Soc. Chim. Belg.*, (1978), 87, 229; and *Tetrahedron Lett.*, (1983), 24, 3815).

10

Scheme 20

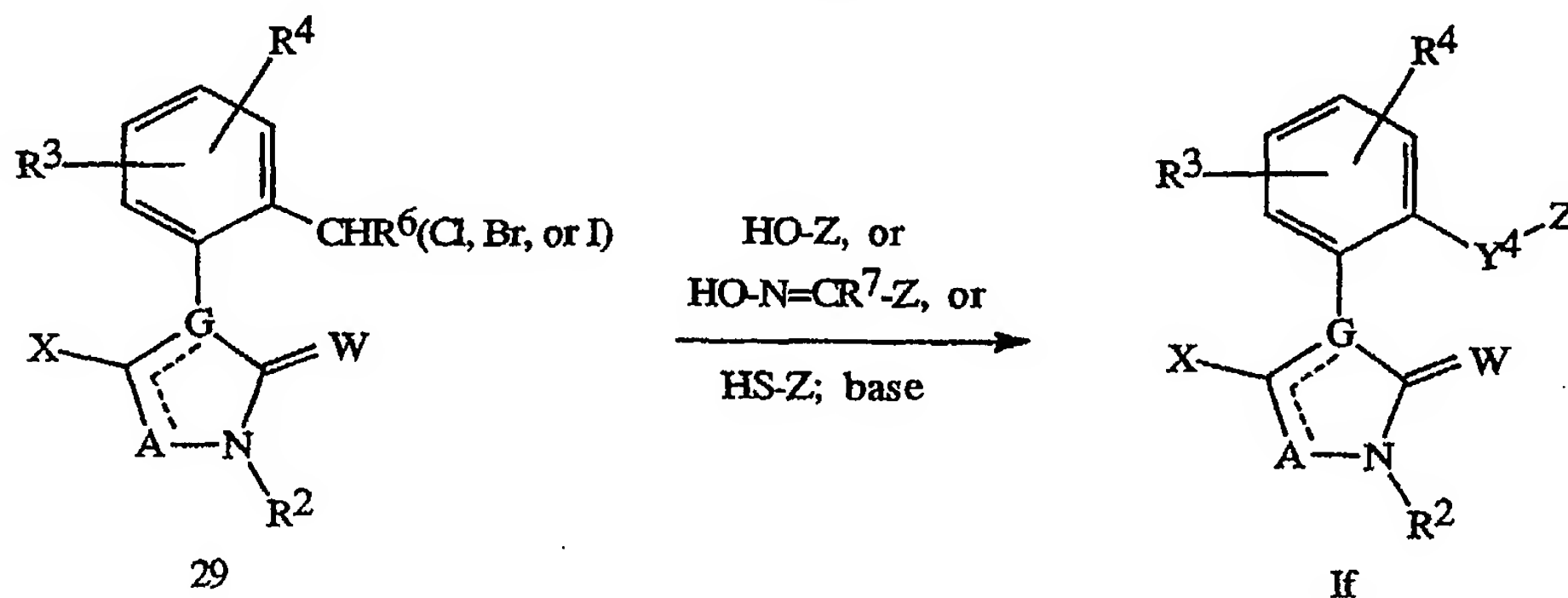


15 5) Aryl Moiety Synthesis Procedures

Compounds of Formula If (compounds of Formula I wherein Y is CHR⁶O, CHR⁶S, or CHR⁶O-N=CR⁷) can be prepared by contacting benzyl halides of Formula 29

with various nucleophiles (Scheme 21). The appropriate alcohol or thiol is treated with a base, for example sodium hydride, to form the corresponding alkoxide or thioalkoxide which acts as the nucleophile.

Scheme 21



5



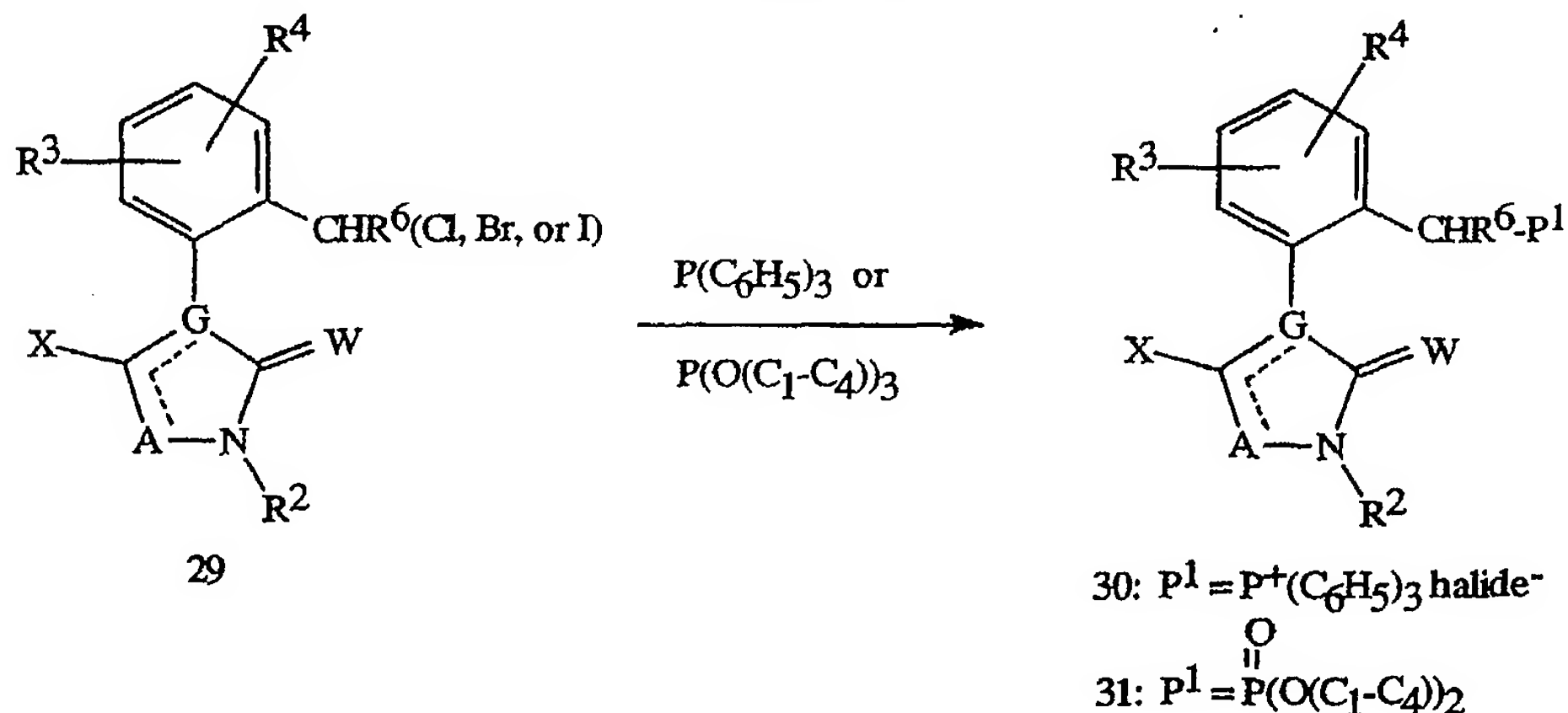
Benzyl halides of Formula 29 can be prepared by radical halogenation of the corresponding alkyl compound (i.e., H instead of halogen in Formula 29), or by acidic cleavage of the corresponding methylether (i.e., OMe instead of halogen in Formula 29).

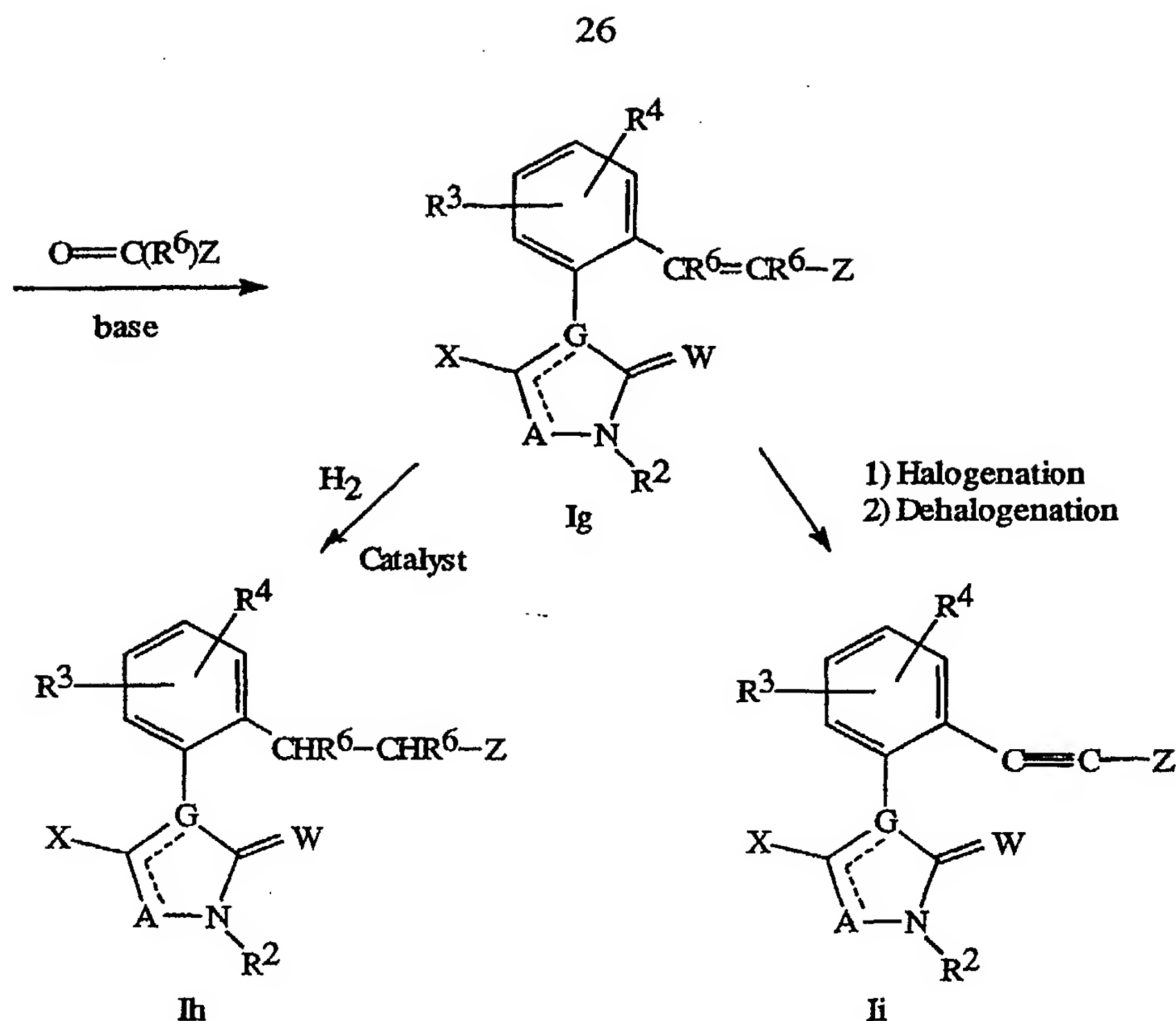
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Compounds of Formula I wherein Y is CR⁶=CR⁶ and CHR⁶-CHR⁶ (Formula Ig and Ih, respectively) can be prepared as illustrated in Scheme 22. Treatment of the benzyl halides of Formula 29 with triphenylphosphine or a trialkylphosphite produces the corresponding phosphonium salt (Formula 30) or phosphonate (Formula 31), respectively. Condensation of the phosphorus compound with a base and a carbonyl compound of Formula Z(R⁶)C=O affords the olefin of Formula Ig.

15

Scheme 22





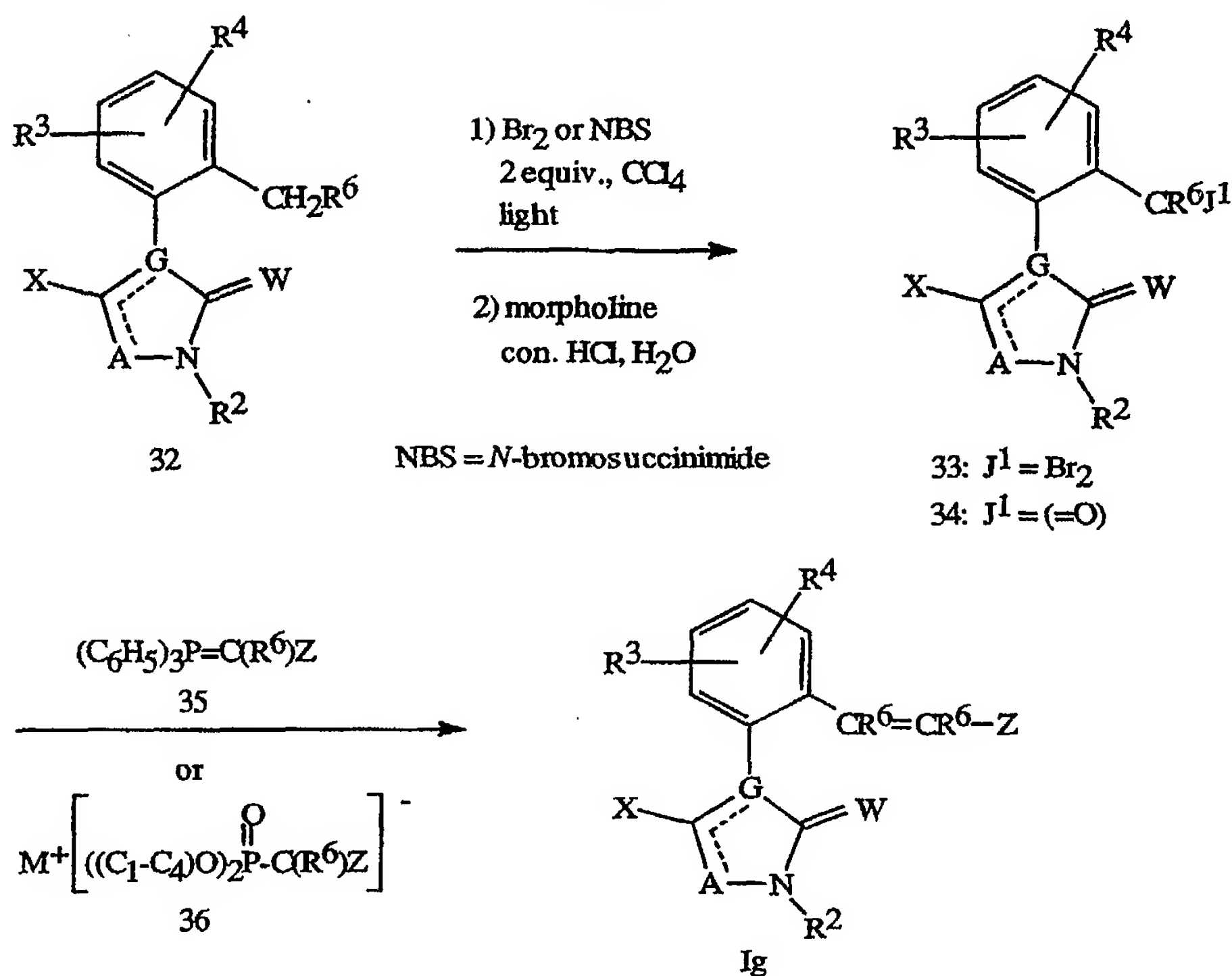
The olefins of Formula Ig can be converted to the saturated compounds of Formula Ih by hydrogenation over a metal catalyst such palladium on carbon as is well-known in the art (Rylander, *Catalytic Hydrogenation in Organic Synthesis*; Academic: New York, 1979).

Formula Ii alkynes can be prepared by halogenation/dehalogenation of Formula Ig olefins using procedures well-known in the art (March, J. *Advanced Organic Chemistry*; 3rd ed., John Wiley: New York, (1985), p 924). Additionally, Formula Ii alkynes can be prepared by well-known reaction of aromatic halides with alkyne derivatives in the presence of catalysts such as nickel or palladium (see *J. Organomet. Chem.*, (1975), 93 253-257).

The olefin of Formula Ig can also be prepared by reversing the reactivity of the reactants in the Wittig or Horner-Emmons condensation. For example, 2-alkylphenyl derivatives of Formula 31 can be converted into the corresponding dibromo-compound of Formula 33 as illustrated in Scheme 23 (see *Synthesis*, (1988), 330). The dibromo-compound can be hydrolyzed to the carbonyl compound of Formula 34, which in turn can be condensed with a phosphorus-containing nucleophile of Formula 35 or 36 to afford the olefin of Formula Ig.

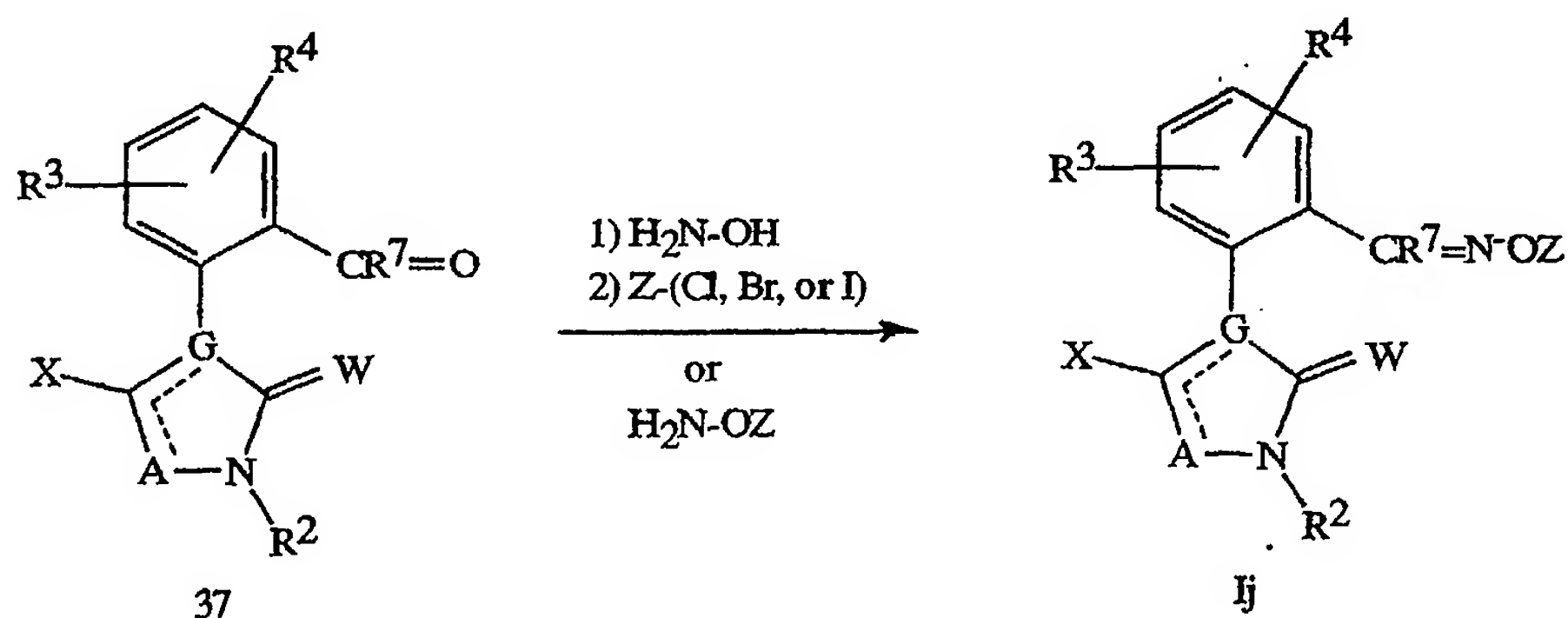
27

Scheme 23



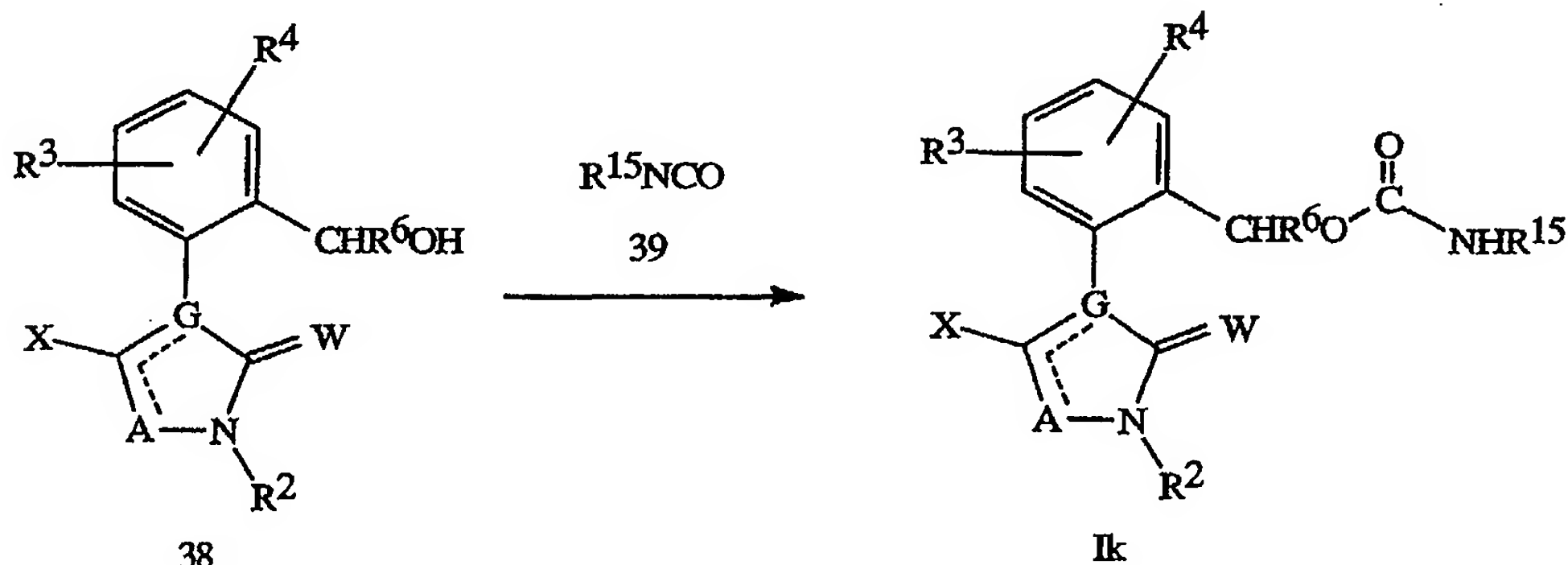
- 5 Oximes of Formula Ij (Formula I wherein Y is C(R⁷)=N-O) can be prepared from carbonyl compounds of Formula 37 by condensation with hydroxylamine, followed by *O*-alkylation with electrophiles of Formula Z-(Cl, Br, or I) (Scheme 24). Alternatively, the *O*-substituted hydroxylamine can be condensed with the carbonyl compound of Formula 37 to yield oximes of Formula Ij directly.

Scheme 24



Carbamates of Formula Ik can be prepared by reacting benzyl alcohols of Formula 38 with isocyanates of Formula 39 (Scheme 25). A base such as triethylamine can be added to catalyze the reaction.

Scheme 25



The following Examples are representative of the production of the novel cyclic amides of Formula I. ¹H NMR Spectra are reported in ppm downfield from tetramethylsilane; s = singlet, d = doublet, t = triplet, dt = doublet of triplets, td = triplet of doublets, m = multiplet.

EXAMPLE 1

Step A: Preparation of Methyl 2-(3-methoxyphenoxy)phenylacetate

(2-Chlorophenyl)acetic acid (60 g), 3-methoxyphenol (87 g), potassium carbonate (97.2 g) and copper (I) chloride (0.6 g) were combined and mechanically stirred to give a thick brown suspension. The suspension was heated for 4.5 h, then cooled to 70°C and 10 mL of *N,N*-dimethylformamide was added. The mixture was poured into ice water and acidified with concentrated aqueous HCl. The mixture was extracted with diethyl ether and the combined extracts were washed with water (4 times) dried (MgSO₄), filtered and concentrated under reduced pressure to provide 122 g of an oil. The crude material was dissolved in 73 mL of methanol and then 2.1 mL of concentrated sulfuric acid was added. The mixture was heated at reflux for 4 h. The mixture was poured into ice water and extracted with diethyl ether. The combined organic phases were washed with 10% aqueous NaOH solution (2 times), then water (4 times), then brine. The organic phase was dried (MgSO₄), filtered and concentrated under reduced pressure to yield 46.4 g (48%) of the title material of Step A as a reddish oil. ¹H NMR (CDCl₃): δ 6.45-7.4 (m, 8H), 3.76 (s, 3H), 3.69 (s, 2H), 3.62 (s, 3H).

Step B: Preparation of Dimethyl [2-(3-methoxyphenoxy)phenyl]propanedioate

Methyl 2-(3-methoxyphenoxy)phenylacetate (6.81 g) was dissolved in 11 mL of dimethyl carbonate and 600 mg of sodium was added. The mixture was heated at reflux

for 10 h, then cooled. The reaction mixture was quenched with water, acidified with concentrated aqueous HCl and extracted with dichloromethane. The combined organic extracts were dried (MgSO₄), filtered and concentrated under reduced pressure to give an oil. The desired material was separated from unreacted starting material by flash chromatography (4:1 hexane: ethyl acetate as eluant) to yield after concentration, 3.54 g (43%) of the title compound of Step B. ¹H NMR (CDCl₃): δ 7.46 (dd, J=1.5, 7.5 Hz, 1H), 7.29 (t, J=8 Hz, 1H), 7.2 (m, 2H), 6.92 (d, J=8 Hz, 1H), 6.65 (td, J=1.5, 7.5 Hz, 1H), 6.5 (m, 2H), 5.14 (s, 1H), 3.77 (s, 3H), 3.73 (s, 6H).

10 Step C: Preparation of 5-Hydroxy-4-[2-(3-methoxyphenoxy)phenyl]-2-methyl-3(2H)-isoxazolone

N-Methylhydroxylamine hydrochloride (2.79 g) was dissolved in 20 mL of methanol at reflux. The solution was cooled and treated with a solution of 3.76 g potassium hydroxide in 15 mL of methanol. The precipitated potassium chloride was removed by filtration and a solution of 3.54 g of dimethyl [2-(3-methoxyphenoxy)-phenyl]propanedioate in 25 mL of methanol was added dropwise. The mixture was stirred at room temperature overnight. The reaction mixture was concentrated under vacuum to a volume of about 30 mL and acidified with concentrated aqueous HCl, with cooling. The solvents were removed under reduced pressure and the residue was partitioned between water and dichloromethane. The combined organic phases were dried (MgSO₄), filtered and concentrated under reduced pressure to yield 2.95 g (88%) of the title compound of Step C. ¹H NMR (CDCl₃): δ 7.2-7.4 (m, 3H), 7.12 (dt, J=1, 7.5 Hz, 1H), 6.81 (d, J=8.5 Hz, 1H), 6.72 (d, J=8 Hz, 1H), 6.6 (m, 2H), 4.43 (s, 1H), 3.77 (s, 3H), 3.28 (s, 3H).

25 Step D: Preparation of 5-Methoxy-4-[2-(3-methoxyphenoxy)phenyl]-2-methyl-3(2H)-isoxazolone

5-Hydroxy-4-[2-(3-methoxyphenoxy)phenyl]-2-methyl-3(2H)-isoxazolone (2.5 g) was dissolved in 3 mL of methanol and 15 mL of toluene and cooled in an icebath. Trimethylsilyldiazomethane (5 mL of a 2.0 M solution in hexane) was added dropwise. Gas evolution was observed. The resulting yellow solution was stirred at room temperature overnight. The solvents were removed under reduced pressure and the residue was purified by flash chromatography (1:1 hexane:ethyl acetate as eluant). The second eluting component was collected to yield 950 mg (36%) of the title compound of Step D. ¹H NMR (CDCl₃): δ 7.51 (dd, J=1.7, 7.5 Hz, 1H), 7.27 (dt, J=1.7, 7.5 Hz, 1H), 7.17 (m, 2H), 6.97 (dd, J=1, 8 Hz, 1H), 6.5 (m, 3H), 3.92 (s, 3H), 3.74 (s, 3H), 3.33 (s, 3H).

35 EXAMPLE 2

Step A: Preparation of 1-(Bromomethyl)-2-iodobenzene

To a solution of 2-iodobenzyl alcohol (50 g) in diethyl ether (500 mL), cooled in an ice-water bath, was added dropwise phosphorus tribromide (28 mL). The reaction

mixture was chilled in a refrigerator for 3.5 h, then quenched by slow addition of methanol (50 mL). The mixture was washed with water, then saturated sodium bicarbonate, then water (100 mL each). The organic phase was dried (MgSO₄), filtered and concentrated under reduced pressure to a white solid, which was triturated in hexane and collected by filtration to yield 58 g (91%) of the title material of Step A as a solid, mp 55-57°C.

Step B: Preparation of 1-Iodo-2-[(2-methylphenoxy)methyl]benzene

Sodium hydride (60% oil dispersion) (7.8 g) was added portionwise to a ice-water cooled solution of *o*-cresol (21.1 g) in tetrahydrofuran (500 mL). The mixture was stirred 20 minutes and then 1-(bromomethyl)-2-iodobenzene (58 g) was added. The mixture was warmed to 60°C for 16 h. Additional sodium hydride (2 g) was added and the reaction mixture heated for an additional 3 h. The reaction mixture was cooled and carefully quenched with water and extracted with ethyl acetate (2 X 250 mL). The combined organic extracts were dried (Mg SO₄), filtered and concentrated under reduced pressure to an oil, which was triturated with cold hexane to provide a solid which was collected by filtration to yield 59.1 g (94%) of the title compound of Step B as a white solid, mp 106-108°C.

Step C: Preparation of Dimethyl [2-[(2-methylphenoxy)methyl]phenyl]propanedioate

To a suspension of sodium hydride (60% oil dispersion) (15.4 g) in 90 mL of 1,3-dimethyl-3,4,5,6-tetrahydro-2 [1H]-pyrimidinone (DMPU), cooled in an ice-water bath, was added dropwise a solution of dimethyl malonate (44 mL) in DMPU (150 mL). The mixture was stirred 20 minutes after the addition was completed, and then 1-iodo-2-[(2-methylphenoxy)methyl]benzene (62.5 g) and cuprous iodide (73.3 g) were added. The resulting mixture was stirred at 100°C for 5 h, then stirred at 25°C overnight. The mixture was diluted with 1 N. HCl (~150 mL) and extracted with diethyl ether (3 X 400 mL). The combined organic extracts were dried (Mg SO₄), filtered and concentrated under reduced pressure to a semi-solid, which was purified by flash chromatography on silica gel (5:2 hexane: ethyl acetate as eluant). The major material was collected and concentrated to a white solid, which was triturated in hexane and collected by filtration to yield 56.9 g (79%) of the title compound of Step C as a white solid, mp 99-103°C.

Step D: Preparation of 5-Hydroxy-4-[2-[(2-methylphenoxy)methyl]phenyl]-3(2H)-isoxazolone

To a solution of *N*-methylhydroxylamine hydrochloride (34.7 g) in methanol (120 mL), cooled in an ice-water bath, was added dropwise a solution of potassium hydroxide (46.6 g) in methanol (80 mL). After the addition was complete, the mixture was stirred 10 minutes. The potassium chloride precipitate was removed by filtration and a solution of dimethyl [2-[(2-methylphenoxy)methyl]phenyl]propanedioate (44 g) in 100 mL of methanol was added to the *N*-methyl-hydroxylamine solution. The mixture

was stirred for 3 days and then cooled in an ice-water bath. Concentrated HCl (15 mL) was added and the solid was removed by filtration. The solvent was removed under vacuum and the residue diluted with ~100 mL of water and then extracted with dichloromethane (3 X 150 mL), then ethyl acetate (3 X 100 mL). The combined organic
5 extracts were dried (Mg SO₄), filtered and concentrated under reduced pressure to yield 31.3 g (75%) of the title compound of Step D as a semi-solid. ¹H NMR (DMSO-d₆): δ 7.4 (m,2H), 7.15 (m,2H), 7.10 (m,2H), 6.8 (m,2H), 5.16 (s,2H), 2.9 (s,3H), 2.23 (s,3H).

Step E: Preparation of 5-Methoxy-2-methyl-4-[2-[(2-methylphenoxy)methyl]phenyl]-3(2H)-isoxazolone

10 5-Hydroxy-4-[2-[(2-methylphenoxy)methyl]phenyl]-3(2H)-isoxazolone (31.3 g) was dissolved in 330 mL of 10:1 toluene:methanol and cooled in an ice-water bath. Trimethylsilyl-diazomethane (~2M in hexane) (55 mL) was added dropwise. Gas evolution was observed. The yellow solution was stirred at 25°C for 2 h. The solution was diluted with 100 mL of water and extracted with ethyl acetate (4 X 100 mL). The
15 combined organic extracts were dried (Mg SO₄), filtered and concentrated under reduced pressure to yield an oil, which was purified by flash chromatography(silica gel; 1:1 hexane:ethyl acetate as eluant). The second eluting component was collected to yield 4.35 g (13%) of the title compound of Step E as a white solid, mp 90-92°C. ¹H NMR (CDCl₃) δ 7.61(d,1H), 7.35(m,3H), 7.12(m,2H), 6.84(m,2H), 5.12(s,2H), 3.96(s,3H),
20 3.41(s,3H), 2.24(s, 3H).

EXAMPLE 3

Step A Preparation of 1-Methyl-N-(2-phenoxyphenyl)hydrazinecarboxamide

2-Phenoxyaniline (5.57 g) and triethylamine (4.2 mL) were dissolved in 100 mL of 1,2-dichloroethane. Triphosgene (Cl₃COC(=O)OCCl₃, 2.97 g) was added and a
25 precipitate formed. The mixture was heated to reflux and the solid redissolved. After 5.5 h, the solution was cooled and 1.6 mL of methyl hydrazine was added and a new precipitate formed. The mixture was stirred at room temperature overnight. The solvent was removed and the residue was partitioned between ethyl acetate and 1N aqueous HCl solution. The organic phases were dried (MgSO₄), filtered, and concentrated under
30 reduced pressure. The residue was purified by flash chromatography (1:1 hexane: ethyl acetate as eluant). The second-least polar component was collected, the eluant was removed under reduced pressure, and the residue was triturated with hexane to afford 3.86 g (50%) of the title compound of Step A, m.p. 117-119°C.

Step B Preparation of 2-Methyl-4-(2-phenoxyphenyl)-5-thioxo-1,2,4-triazolidin-3-one

35 A solution of 1.54 g of 1-methyl-N-(2-phenoxyphenyl)hydrazinecarboxamide in 50 mL of tetrahydrofuran, cooled in an ice bath, was treated with 0.46 mL of thiophosgene, and then 1.68 mL of triethylamine. A precipitate formed and the mixture was stirred at ambient temperature overnight. The precipitate was removed by filtration

and washed with tetrahydrofuran. The combined filtrate and washings were concentrated under reduced pressure to afford 1.8 g of an amber glassy oil. The crude material was used in the next step without further purification. ^1H NMR (CDCl_3): δ 6.8-7.4 (m, 9H), 3.57 (s, 3H).

5 Step C Preparation of 2,4-Dihydro-2-methyl-5-(methylthio)-4-(2-phenoxyphenyl)-3H-1,2,4-triazol-3-one

A solution of 900 mg of crude 2-methyl-4-(2-phenoxyphenyl)-5-thioxo-1,2,4-triazolidin-3-one in 50 mL of tetrahydrofuran was treated with 150 mg of sodium hydride (60% oil dispersion). After 5 minutes, 0.5 mL of iodomethane was added, and
10 the mixture was stirred at ambient temperature overnight. The solid was removed by filtration and the filtrate concentrated to an oil. The oil was partitioned between ether and 1N hydrochloric acid solution. The organic phases were dried (MgSO_4), filtered and concentrated under reduced pressure. The residue was triturated in hexane/*n*-butyl chloride to afford 530 mg (56%) of the title compound of Step C, m.p. 129-130°C.

15 EXAMPLE 4

Step A: Preparation of 2,2-Dimethyl-N-(2-methylphenyl) hydrazine carboxamide

o-Tolyl isocyanate (10.0 g) was dissolved in 75 mL toluene under N_2 . The solution was cooled to 5°C and to this was slowly added a solution in toluene of 1,1-dimethylhydrazine (5.7 mL). After addition, the ice-bath was removed and the
20 resulting slurry allowed to stir an additional 10 minutes. The solid was filtered off rinsing successively with hexane, a small amount of 20% diethylether/hexane, then hexanes again. This afforded 11.1 g (77%) of the title compound of Step A. ^1H NMR (CDCl_3) δ 8.1 (bs, 1H), 7.94 (d, 1H), 7.21-7.15 (m, 3H), 6.99 (t, 1H), 5.23 (bs, 1H), 2.63 (s, 6H), 2.27 (s, 3H).

25 Step B: Preparation of 5-Chloro 2,4-dihydro-2-methyl-4-(2-methylphenyl)-3H-1,2,4-triazol-3-one

To a solution of 11.1 g 2,2-dimethyl-N-(2-methylphenyl) hydrazine carboxamide dissolved in 600 mL methylene chloride under N_2 was added 17.1 g triphosgene. The solution was heated at reflux overnight, cooled, then concentrated under reduced
30 pressure. The resulting residue was dissolved in ethyl acetate and washed with water, then saturated aqueous NaCl. The organic phase was dried (MgSO_4), filtered, and concentrated under reduced pressure. The residue was purified by flash chromatography (30-50% ethyl acetate/hexanes as eluent) to afford 8.25 g (64%) of the title compound of Step B. ^1H NMR (CDCl_3) δ 7.42-7.30 (m, 3H), 7.17 (d, 1H), 3.54 (s, 3H), 2.22 (s, 3H).

35 Step C: Preparation of 2,4-Dihydro-5-methoxy-2-methyl-4-(2-methylphenyl)-3H-1,2,4-triazol-3-one

8.25 g 5-chloro-2,4-dihydro-2-methyl-4-(2-methylphenyl)-3H-1,2,4-triazol-3-one was dissolved in 80 mL 1:1 dimethoxyethane/methanol under N_2 . 14.0 mL sodium

methoxide (30% solution in methanol) was added and the solution was heated at reflux for 3 h. The mixture was allowed to cool, diluted with ethyl acetate, washed with water, then saturated aqueous NaCl. The combined organic extracts were dried (MgSO₄), filtered, and concentrated under reduced pressure. The residue was purified by flash chromatography (50-70% ethyl acetate/hexanes as eluent) and triturated with 50% diethylether/hexanes to afford 6.7 g of the title compound of Step C (95% pure).
¹H NMR (CDCl₃) δ 7.35-7.27 (m,3H), 7.18 (d,1H), 3.94 (s,3H), 3.46 (s,3H), 2.22 (s,3H).

10 Step D: Preparation of 4-[2-(Bromomethyl)phenyl]-2,4-dihydro-5-methoxy-2-methyl-3H-1,2,4-triazol-3-one

To a solution/suspension of 6.7 g 2,4-dihydro-5-methoxy-2-methyl-4-(2-methylphenyl)-3H-1,2,4-triazol-3-one dissolved in 95 mL carbon tetrachloride under N₂ was added *N*-bromosuccinimide (6.53 g) followed by a catalytic amount of benzoyl peroxide. The solution was heated at reflux for 2 h. Another 1.63 g *N*-bromosuccinimide and a catalytic amount of benzoyl peroxide were added and the solution was heated at reflux for an hour. After cooling, methylene chloride was added and the organic layer was washed successively with water, then 0.1 N sodium thiosulfate solution, then saturated aqueous NaCl. The combined organic extracts were dried (MgSO₄), filtered, and concentrated under reduced pressure. The residue was purified by flash chromatography (3-10% diethylether/methylene chloride as eluent) to afford 3.12 g of the title compound of Step D. ¹H NMR (CDCl₃) δ 7.5 (m,1H), 7.44 (m,2H), 7.22 (m,1H), 4.60 (d,1H), 4.36 (d,1H), 3.96 (s,3H), 3.47 (s,3H).

25 Step E: Preparation of 2,4-Dihydro-5-methoxy-2-methyl-4-[2-[[[(phenylmethylene)-amine]oxy]methyl]phenyl]-3H-1,2,4-triazol-3-one

0.40 g 4-[2-(bromomethyl)phenyl]-2,4-dihydro-5-methoxy-2-methyl-3H-1,2,4-triazol-3-one was dissolved in approximately 5 mL *N,N*-dimethylformamide under N₂ and to this was added 0.20 g acetophenone oxime, followed by 0.07 g of 60% sodium hydride. The solution was allowed to stir 4 h at room temperature then was diluted with ethyl acetate, washed with water, then saturated aqueous NaCl. The organic phase was dried (MgSO₄), filtered, and concentrated under reduced pressure. The residue was purified by flash chromatography (60% ethyl acetate/hexanes as eluent) to afford 0.38 g of the title compound of Step E. ¹H NMR (CDCl₃) δ 7.6 (m,3H), 7.44 (m,2H), 7.35 (m,3H), 7.25 (m,1H), 5.26 (d,1H), 5.22 (d,1H), 3.88 (s,3H), 3.40 (s,3H), 2.20 (s,3H).

35 By the general procedures described herein, or through obvious modifications thereof, the compound of the Tables 1-26 can be prepared.

The following abbreviations are used in the Tables which follow. All alkyl groups are the normal isomers unless indicated otherwise.

n = normal

i = iso

Me = methyl

Et = ethyl

MeO = methoxy

Pr = propyl

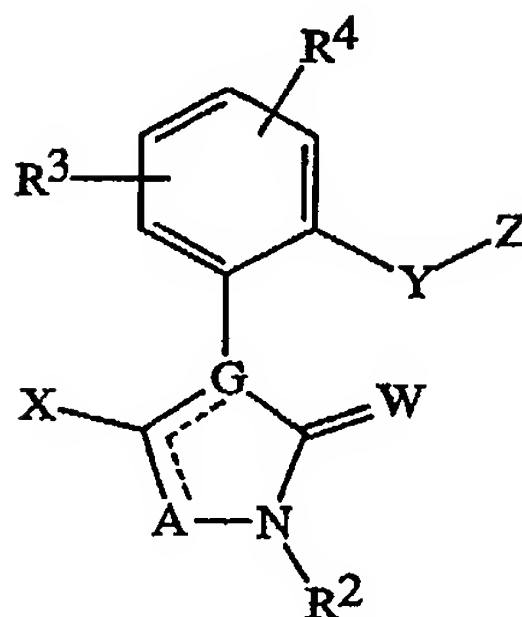
CN = cyano

c = cyclo

MeS = methylthio

Bu = butyl

Ph = phenyl

NO₂ = nitro

I

Table 1

Compounds of Formula I wherein: G = C, W = O, R³ = R⁴ = H, Y = CH₂ON=C(CH₃), Z = 3-CF₃-Ph, the floating double bond is attached to G, and

R² = Me

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
H ₂ C=CHCH ₂ O	O	H ₂ C=CHCH ₂ S	O	H ₂ C=CHCH ₂ O	S	H ₂ C=CHCH ₂ S	S
HC≡CCH ₂ O	O	HC≡CCH ₂ S	O	HC≡CCH ₂ O	S	HC≡CCH ₂ S	S
CF ₃ O	O	CF ₃ S	O	CF ₃ O	S	CF ₃ S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

R² = Et

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
H ₂ C=CHCH ₂ O	O	H ₂ C=CHCH ₂ S	O	H ₂ C=CHCH ₂ O	S	H ₂ C=CHCH ₂ S	S
HC≡CCH ₂ O	O	HC≡CCH ₂ S	O	HC≡CCH ₂ O	S	HC≡CCH ₂ S	S
CF ₃ O	O	CF ₃ S	O	CF ₃ O	S	CF ₃ S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

$R^2 = n\text{-Pr}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
H ₂ C=CHCH ₂ O	O	H ₂ C=CHCH ₂ S	O	H ₂ C=CHCH ₂ O	S	H ₂ C=CHCH ₂ S	S
HC≡CCH ₂ O	O	HC≡CCH ₂ S	O	HC≡CCH ₂ O	S	HC≡CCH ₂ S	S
CF ₃ O	O	CF ₃ S	O	CF ₃ O	S	CF ₃ S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

 $R^2 = H$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
H ₂ C=CHCH ₂ O	O	H ₂ C=CHCH ₂ S	O	H ₂ C=CHCH ₂ O	S	H ₂ C=CHCH ₂ S	S
HC≡CCH ₂ O	O	HC≡CCH ₂ S	O	HC≡CCH ₂ O	S	HC≡CCH ₂ S	S
CF ₃ O	O	CF ₃ S	O	CF ₃ O	S	CF ₃ S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

 $R^2 = Me$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	NH	MeS	NH	MeO	NMe	MeS	NMe
EtO	NH	EtS	NH	EtO	NMe	EtS	NMe
n-PrO	NH	n-PrS	NH	n-PrO	NMe	n-PrS	NMe
H ₂ C=CHCH ₂ O	NH	H ₂ C=CHCH ₂ S	NH	H ₂ C=CHCH ₂ O	NMe	H ₂ C=CHCH ₂ S	NMe
HC≡CCH ₂ O	NH	HC≡CCH ₂ S	NH	HC≡CCH ₂ O	NMe	HC≡CCH ₂ S	NMe
CF ₃ O	NH	CF ₃ S	NH	CF ₃ O	NMe	CF ₃ S	NMe
(c-propyl)O	NH	(c-propyl)S	NH	(c-propyl)O	NMe	(c-propyl)S	NMe

 $R^2 = H$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	NH	MeS	NH	MeO	NMe	MeS	NMe
EtO	NH	EtS	NH	EtO	NMe	EtS	NMe
n-PrO	NH	n-PrS	NH	n-PrO	NMe	n-PrS	NMe
H ₂ C=CHCH ₂ O	NH	H ₂ C=CHCH ₂ S	NH	H ₂ C=CHCH ₂ O	NMe	H ₂ C=CHCH ₂ S	NMe
HC≡CCH ₂ O	NH	HC≡CCH ₂ S	NH	HC≡CCH ₂ O	NMe	HC≡CCH ₂ S	NMe

CF ₃ O	NH	CF ₃ S	NH	CF ₃ O	NMe	CF ₃ S	NMe
(c-propyl)O	NH	(c-propyl)S	NH	(c-propyl)O	NMe	(c-propyl)S	NMe

Table 2

Compounds of Formula I wherein: G = N, W = O, R³ = R⁴ = H, Y = CH₂ON=C(CH₃), Z = 3-CF₃-Ph, the floating double bond is attached to A, and

R² = Me

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH
n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

R² = Et

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH
n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

R² = n-Pr

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH
n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

$R^2 = H$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH
n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

 $R^2 = Me$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	CMe	MeS	CMe	MeO	CEt	MeO	CEt
EtO	CMe	EtS	CMe	EtO	CEt	EtO	CEt
n-PrO	CMe	n-PrS	CMe	n-PrO	CEt	n-PrO	CEt
H ₂ C=CHCH ₂ O	CMe	H ₂ C=CHCH ₂ S	CMe	H ₂ C=CHCH ₂ O	CEt	H ₂ C=CHCH ₂ O	CEt
HC≡CCH ₂ O	CMe	HC≡CCH ₂ S	CMe	HC≡CCH ₂ O	CEt	HC≡CCH ₂ O	CEt
CF ₃ O	CMe	CF ₃ S	CMe	CF ₃ O	CEt	CF ₃ O	CEt
(c-propyl)O	CMe	(c-propyl)S	CMe	(c-propyl)O	CEt	(c-propyl)O	CEt

 $R^2 = H$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	CEt	MeS	CEt	MeO	CMe	MeO	CMe
EtO	CEt	EtS	CEt	EtO	CMe	EtO	CMe
n-PrO	CEt	n-PrS	CEt	n-PrO	CMe	n-PrO	CMe
H ₂ C=CHCH ₂ O	CEt	H ₂ C=CHCH ₂ S	CEt	H ₂ C=CHCH ₂ O	CMe	H ₂ C=CHCH ₂ O	CMe
HC≡CCH ₂ O	CEt	HC≡CCH ₂ S	CEt	HC≡CCH ₂ O	CMe	HC≡CCH ₂ O	CMe
CF ₃ O	CEt	CF ₃ S	CEt	CF ₃ O	CMe	CF ₃ O	CMe
(c-propyl)O	CEt	(c-propyl)S	CEt	(c-propyl)O	CMe	(c-propyl)O	CMe

Table 3

Compounds of Formula I wherein: $G = C$, $W = O$, $R^3 = R^4 = H$, $Y = CH_2O$, $Z = 2\text{-Me-Ph}$,
the floating double bond is attached to G, and

 $R^2 = Me$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S

$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	S	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	S
$\text{HC}\equiv\text{CCH}_2\text{O}$	O	$\text{HC}\equiv\text{CCH}_2\text{S}$	O	$\text{HC}\equiv\text{CCH}_2\text{O}$	S	$\text{HC}\equiv\text{CCH}_2\text{S}$	S
CF_3O	O	CF_3S	O	CF_3O	S	CF_3S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

 $\text{R}^2 = \text{Et}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	S	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	S
$\text{HC}\equiv\text{CCH}_2\text{O}$	O	$\text{HC}\equiv\text{CCH}_2\text{S}$	O	$\text{HC}\equiv\text{CCH}_2\text{O}$	S	$\text{HC}\equiv\text{CCH}_2\text{S}$	S
CF_3O	O	CF_3S	O	CF_3O	S	CF_3S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

 $\text{R}^2 = \text{n-Pr}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	S	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	S
$\text{HC}\equiv\text{CCH}_2\text{O}$	O	$\text{HC}\equiv\text{CCH}_2\text{S}$	O	$\text{HC}\equiv\text{CCH}_2\text{O}$	S	$\text{HC}\equiv\text{CCH}_2\text{S}$	S
CF_3O	O	CF_3S	O	CF_3O	S	CF_3S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

 $\text{R}^2 = \text{H}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	O	$\text{H}_2\text{C}=\text{CHCH}_2\text{O}$	S	$\text{H}_2\text{C}=\text{CHCH}_2\text{S}$	S
$\text{HC}\equiv\text{CCH}_2\text{O}$	O	$\text{HC}\equiv\text{CCH}_2\text{S}$	O	$\text{HC}\equiv\text{CCH}_2\text{O}$	S	$\text{HC}\equiv\text{CCH}_2\text{S}$	S
CF_3O	O	CF_3S	O	CF_3O	S	CF_3S	S
(c-propyl)O	O	(c-propyl)S	O	(c-propyl)O	S	(c-propyl)S	S

$R^2 = \text{Me}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	NH	MeS	NH	MeO	NMe	MeS	NMe
EtO	NH	EtS	NH	EtO	NMe	EtS	NMe
n-PrO	NH	n-PrS	NH	n-PrO	NMe	n-PrS	NMe
H ₂ C=CHCH ₂ O	NH	H ₂ C=CHCH ₂ S	NH	H ₂ C=CHCH ₂ O	NMe	H ₂ C=CHCH ₂ S	NMe
HC≡CCH ₂ O	NH	HC≡CCH ₂ S	NH	HC≡CCH ₂ O	NMe	HC≡CCH ₂ S	NMe
CF ₃ O	NH	CF ₃ S	NH	CF ₃ O	NMe	CF ₃ S	NMe
(c-propyl)O	NH	(c-propyl)S	NH	(c-propyl)O	NMe	(c-propyl)S	NMe

 $R^2 = \text{H}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	NH	MeS	NH	MeO	NMe	MeS	NMe
EtO	NH	EtS	NH	EtO	NMe	EtS	NMe
n-PrO	NH	n-PrS	NH	n-PrO	NMe	n-PrS	NMe
H ₂ C=CHCH ₂ O	NH	H ₂ C=CHCH ₂ S	NH	H ₂ C=CHCH ₂ O	NMe	H ₂ C=CHCH ₂ S	NMe
HC≡CCH ₂ O	NH	HC≡CCH ₂ S	NH	HC≡CCH ₂ O	NMe	HC≡CCH ₂ S	NMe
CF ₃ O	NH	CF ₃ S	NH	CF ₃ O	NMe	CF ₃ S	NMe
(c-propyl)O	NH	(c-propyl)S	NH	(c-propyl)O	NMe	(c-propyl)S	NMe

Table 4

Compounds of Formula I wherein: G = N, W = O, R³ = R⁴ = H, Y = CH₂O, Z = 2-Me-Ph, the floating double bond is attached to A, and

 $R^2 = \text{Me}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH
n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

 $R^2 = \text{Et}$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH

n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

R² = n-Pr

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH
n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

R² = H

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	N	MeS	N	MeO	CH	MeO	CH
EtO	N	EtS	N	EtO	CH	EtO	CH
n-PrO	N	n-PrS	N	n-PrO	CH	n-PrO	CH
H ₂ C=CHCH ₂ O	N	H ₂ C=CHCH ₂ S	N	H ₂ C=CHCH ₂ O	CH	H ₂ C=CHCH ₂ O	CH
HC≡CCH ₂ O	N	HC≡CCH ₂ S	N	HC≡CCH ₂ O	CH	HC≡CCH ₂ O	CH
CF ₃ O	N	CF ₃ S	N	CF ₃ O	CH	CF ₃ O	CH
(c-propyl)O	N	(c-propyl)S	N	(c-propyl)O	CH	(c-propyl)O	CH

R² = Me

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	CMe	MeS	CMe	MeO	CEt	MeO	CEt
EtO	CMe	EtS	CMe	EtO	CEt	EtO	CEt
n-PrO	CMe	n-PrS	CMe	n-PrO	CEt	n-PrO	CEt
H ₂ C=CHCH ₂ O	CMe	H ₂ C=CHCH ₂ S	CMe	H ₂ C=CHCH ₂ O	CEt	H ₂ C=CHCH ₂ O	CEt
HC≡CCH ₂ O	CMe	HC≡CCH ₂ S	CMe	HC≡CCH ₂ O	CEt	HC≡CCH ₂ O	CEt
CF ₃ O	CMe	CF ₃ S	CMe	CF ₃ O	CEt	CF ₃ O	CEt
(c-propyl)O	CMe	(c-propyl)S	CMe	(c-propyl)O	CEt	(c-propyl)O	CEt

$R^2 = H$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	CEt	MeS	CEt	MeO	CMe	MeO	CMe
EtO	CEt	EtS	CEt	EtO	CMe	EtO	CMe
n-PrO	CEt	n-PrS	CEt	n-PrO	CMe	n-PrO	CMe
H ₂ C=CHCH ₂ O	CEt	H ₂ C=CHCH ₂ S	CEt	H ₂ C=CHCH ₂ O	CMe	H ₂ C=CHCH ₂ O	CMe
HC≡CCH ₂ O	CEt	HC≡CCH ₂ S	CEt	HC≡CCH ₂ O	CMe	HC≡CCH ₂ O	CMe
CF ₃ O	CEt	CF ₃ S	CEt	CF ₃ O	CMe	CF ₃ O	CMe
(c-propyl)O	CEt	(c-propyl)S	CEt	(c-propyl)O	CMe	(c-propyl)O	CMe

Table 5

Compounds of Formula I wherein: G = C, W = S, $R^3 = R^4 = H$, Y = CH₂ON=C(CH₃), Z = 3-CF₃-Ph, the floating double bond is attached to G, and

 $R^2 = Me$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
H ₂ C=CHCH ₂ O	O	H ₂ C=CHCH ₂ S	O	H ₂ C=CHCH ₂ O	S	H ₂ C=CHCH ₂ S	S
HC≡CCH ₂ O	O	HC≡CCH ₂ S	O	HC≡CCH ₂ O	S	HC≡CCH ₂ S	S
CF ₃ O	O	CF ₃ S	O	CF ₃ O	S	CF ₃ S	S
MeO	NH	MeO	NMe	MeO	NEt	MeS	NPr

Table 6

Compounds of Formula I wherein: A = N, G = N, W = S, $R^3 = R^4 = H$, Y = CH₂ON=C(Me), Z = 3-CF₃-Ph, the floating double bond is attached to A, and

 $R^2 = Me$

<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
MeO	EtO	n-PrO	H ₂ C=CHCH ₂ O
HC≡CCH ₂ O	CF ₃ O	OCF ₂ H	OCH ₂ CF ₃
(c-propyl)O	MeS	EtS	n-PrS
H ₂ C=CHCH ₂ S	HC≡CCH ₂ S	CF ₃ S	(c-propyl)S

Table 7

Compounds of Formula I wherein: $G = C$, $W = S$, $R^3 = R^4 = H$, $Y = CH_2O$, $Z = 2\text{-Me-Ph}$, the floating double bond is attached to G , and

$R^2 = Me$

<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>	<u>X</u>	<u>A</u>
MeO	O	MeS	O	MeO	S	MeS	S
EtO	O	EtS	O	EtO	S	EtS	S
n-PrO	O	n-PrS	O	n-PrO	S	n-PrS	S
$H_2C=CHCH_2O$	O	$H_2C=CHCH_2S$	O	$H_2C=CHCH_2O$	S	$H_2C=CHCH_2S$	S
$HC\equiv CCH_2O$	O	$HC\equiv CCH_2S$	O	$HC\equiv CCH_2O$	S	$HC\equiv CCH_2S$	S
CF_3O	O	CF_3S	O	CF_3O	S	CF_3S	S
MeO	NH	MeO	NMe	MeO	NEt	MeS	NPr

Table 8

Compounds of Formula I wherein: $A = N$, $G = N$, $W = S$, $R^3 = R^4 = H$, $Y = CH_2O$, $Z = 2\text{-Me-Ph}$, the floating double bond is attached to A , and

$R^2 = Me$

<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>
MeO	EtO	n-PrO	$H_2C=CHCH_2O$
$HC\equiv CCH_2O$	CF_3O	OCF_2H	OCH_2CF_3
(c-propyl)O	MeS	EtS	n-PrS
$H_2C=CHCH_2S$	$HC\equiv CCH_2S$	CF_3S	(c-propyl)S

Table 9

Compounds of Formula I wherein: $G = C$, $A = W = O$, $X = MeO$, $R^2 = Me$, $Y = CH_2ON=C(Me)$, $Z = 3\text{-CF}_3\text{-Ph}$, the floating double bond is attached to G , and

<u>R³</u>	<u>R⁴</u>	<u>R³</u>	<u>R⁴</u>	<u>R³</u>	<u>R⁴</u>
3-F	H	5-NO ₂	H	3-F	5-F
5-F	H	6-Me	H	3-Cl	5-Cl
3-Cl	H	3-Me	H	4-Me	5-Cl
4-Cl	H	4-MeO	H	3-F	5-CF ₃
5-Br	H	5-CF ₃ O	H	3-Cl	5-NO ₂
4-CF ₃	H	5-allyl	H	6-CF ₃ O	H
5-CN	H	4-propargyl	H	5-Pr	H

Table 10

Compounds of Formula I wherein: A = N, G = N, W = O, X = MeO, R² = Me, Y = CH₂ON=C(Me), Z = 3-CF₃-Ph, the floating double bond is attached to A, and

<u>R³</u>	<u>R⁴</u>	<u>R³</u>	<u>R⁴</u>	<u>R³</u>	<u>R⁴</u>
3-F	H	5-NO ₂	H	3-F	5-F
5-F	H	6-Me	H	3-Cl	5-Cl
3-Cl	H	3-Me	H	4-Me	5-Cl
4-Cl	H	4-MeO	H	3-F	5-CF ₃
5-Br	H	5-CF ₃ O	H	3-Cl	5-NO ₂
4-CF ₃	H	5-allyl	H	6-CF ₃ O	H
5-CN	H	4-propargyl	H	5-Pr	H

Table 11

Compounds of Formula I wherein: A = O, G = C, W = O, X = MeO, R² = Me, the floating double bond is attached to G, and

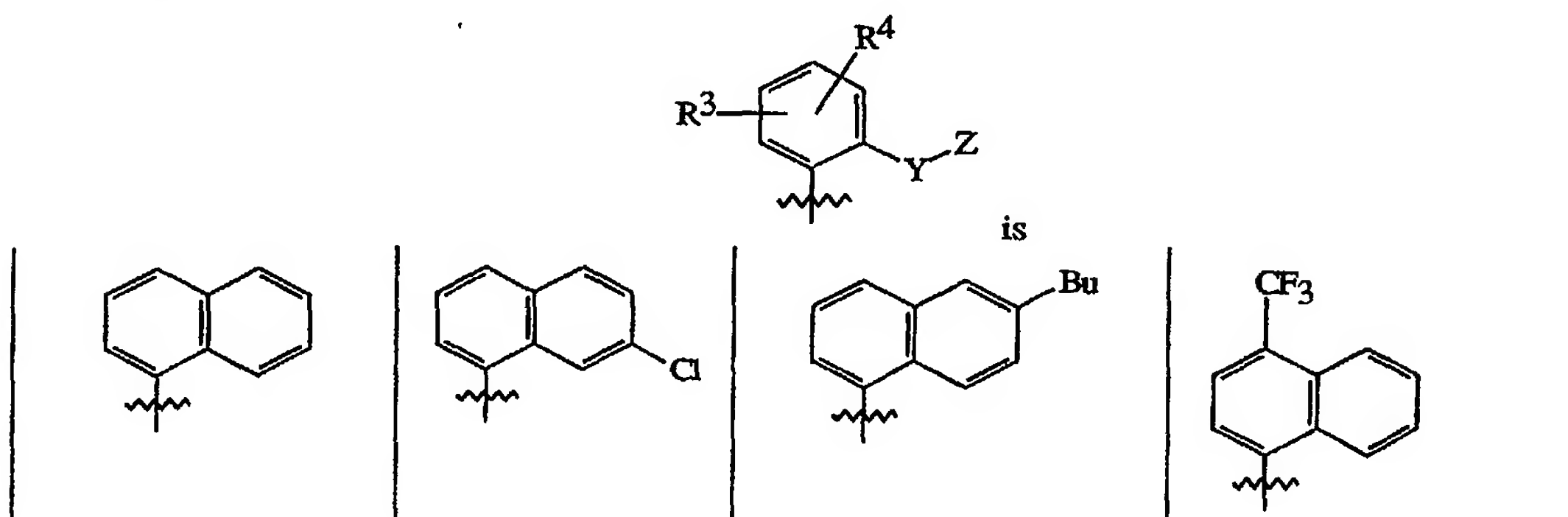


Table 12

Compounds of Formula I wherein: A = N, G = N, W = O, X = MeO, R² = Me, the floating double bond is attached to A, and

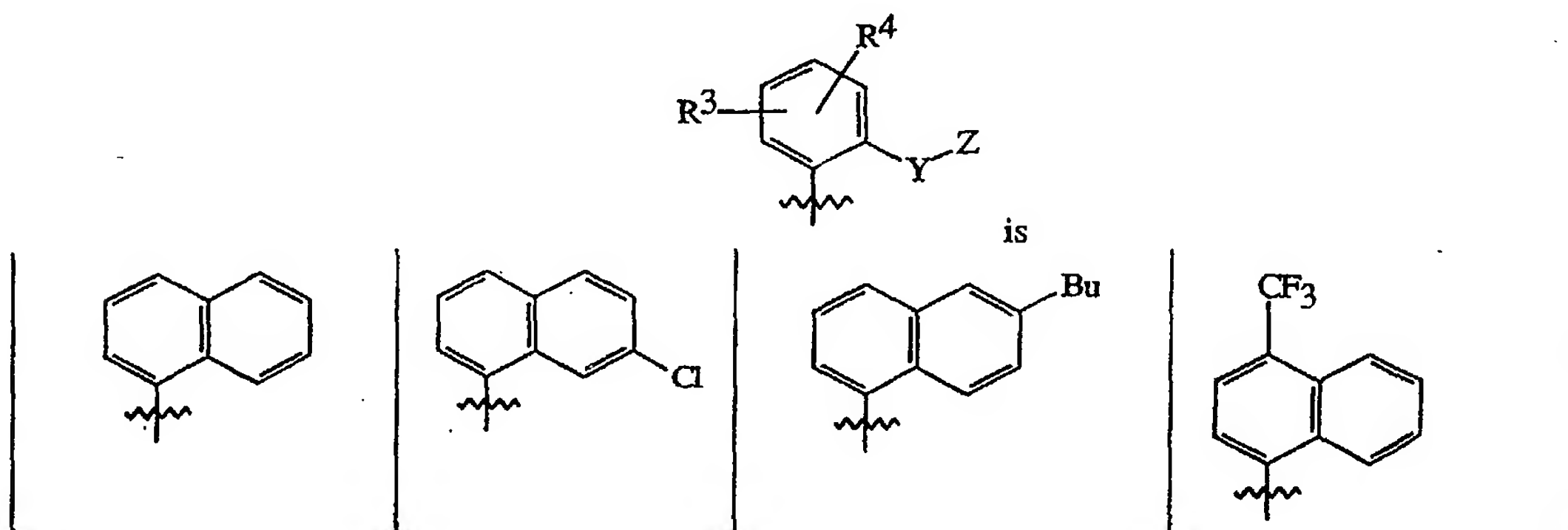


Table 13

Compounds of Formula I wherein: $G = C$, $W = O$, $X = \text{MeO}$, $R^2 = \text{Me}$, $R^3 = R^4 = \text{H}$, $Z = \text{Ph}$,
the floating double bond is attached to G , and

$A = O$

<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
S	CH_2CH_2	$\text{CH}(\text{Me})\text{O}$	SCH_2	$\text{C}(\text{Me})=\text{N}-\text{O}$
$\text{CH}=\text{CH}$	$\text{CH}(\text{Me})\text{CH}_2$	OCH_2	$\text{SCH}(\text{Me})$	$\text{O}-\text{N}=\text{CH}$
$\text{C}(\text{Me})=\text{CH}$	$\text{CH}_2\text{CH}(\text{Me})$	$\text{OCH}(\text{Me})$	$\text{CH}_2\text{O}-\text{N}=\text{CH}$	$\text{O}-\text{N}=\text{C}(\text{Me})$
$\text{CH}=\text{C}(\text{Me})$	$\text{CH}(\text{Me})\text{CH}(\text{Me})$	CH_2S	$\text{CH}_2\text{O}-\text{N}=\text{C}(\text{Me})$	$\text{CH}_2\text{OC}(=\text{O})$
$\text{C}(\text{Me})=\text{C}(\text{Me})$	CH_2O	$\text{CH}(\text{Me})\text{S}$	$\text{CH}=\text{N}-\text{O}$	$\text{CH}(\text{Me})\text{OC}(=\text{O})$
direct bond	$\text{C}\equiv\text{C}$			

$A = S$

<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
S	CH_2CH_2	$\text{CH}(\text{Me})\text{O}$	SCH_2	$\text{C}(\text{Me})=\text{N}-\text{O}$
$\text{CH}=\text{CH}$	$\text{CH}(\text{Me})\text{CH}_2$	OCH_2	$\text{SCH}(\text{Me})$	$\text{O}-\text{N}=\text{CH}$
$\text{C}(\text{Me})=\text{CH}$	$\text{CH}_2\text{CH}(\text{Me})$	$\text{OCH}(\text{Me})$	$\text{CH}_2\text{O}-\text{N}=\text{CH}$	$\text{O}-\text{N}=\text{C}(\text{Me})$
$\text{CH}=\text{C}(\text{Me})$	$\text{CH}(\text{Me})\text{CH}(\text{Me})$	CH_2S	$\text{CH}_2\text{O}-\text{N}=\text{C}(\text{Me})$	$\text{CH}_2\text{OC}(=\text{O})$
$\text{C}(\text{Me})=\text{C}(\text{Me})$	CH_2O	$\text{CH}(\text{Me})\text{S}$	$\text{CH}=\text{N}-\text{O}$	$\text{CH}(\text{Me})\text{OC}(=\text{O})$
direct bond	$\text{C}\equiv\text{C}$			

$A = \text{NMe}$

<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
S	CH_2CH_2	$\text{CH}(\text{Me})\text{O}$	SCH_2	$\text{C}(\text{Me})=\text{N}-\text{O}$
$\text{CH}=\text{CH}$	$\text{CH}(\text{Me})\text{CH}_2$	OCH_2	$\text{SCH}(\text{Me})$	$\text{O}-\text{N}=\text{CH}$
$\text{C}(\text{Me})=\text{CH}$	$\text{CH}_2\text{CH}(\text{Me})$	$\text{OCH}(\text{Me})$	$\text{CH}_2\text{O}-\text{N}=\text{CH}$	$\text{O}-\text{N}=\text{C}(\text{Me})$
$\text{CH}=\text{C}(\text{Me})$	$\text{CH}(\text{Me})\text{CH}(\text{Me})$	CH_2S	$\text{CH}_2\text{O}-\text{N}=\text{C}(\text{Me})$	$\text{CH}_2\text{OC}(=\text{O})$
$\text{C}(\text{Me})=\text{C}(\text{Me})$	CH_2O	$\text{CH}(\text{Me})\text{S}$	$\text{CH}=\text{N}-\text{O}$	$\text{CH}(\text{Me})\text{OC}(=\text{O})$
direct bond	$\text{C}\equiv\text{C}$			

Table 14

Compounds of Formula I wherein: $G = \text{N}$, $W = O$, $X = \text{MeO}$, $R^2 = \text{Me}$, $R^3 = R^4 = \text{H}$, $Z = \text{Ph}$,
the floating double bond is attached to A , and

$A = \text{N}$

<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
S	CH_2CH_2	$\text{CH}(\text{Me})\text{O}$	SCH_2	$\text{C}(\text{Me})=\text{N}-\text{O}$
$\text{CH}=\text{CH}$	$\text{CH}(\text{Me})\text{CH}_2$	OCH_2	$\text{SCH}(\text{Me})$	$\text{O}-\text{N}=\text{CH}$
$\text{C}(\text{Me})=\text{CH}$	$\text{CH}_2\text{CH}(\text{Me})$	$\text{OCH}(\text{Me})$	$\text{CH}_2\text{O}-\text{N}=\text{CH}$	$\text{O}-\text{N}=\text{C}(\text{Me})$

CH=C(Me)	CH(Me)CH(Me)	CH ₂ S	CH ₂ O-N=C(Me)	CH ₂ OC(=O)
C(Me)=C(Me)	CH ₂ O	CH(Me)S	CH=N-O	CH(Me)OC(=O)
direct bond	C≡C			

A = S

<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
S	CH ₂ CH ₂	CH(Me)O	SCH ₂	C(Me)=N-O
CH=CH	CH(Me)CH ₂	OCH ₂	SCH(Me)	O-N=CH
C(Me)=CH	CH ₂ CH(Me)	OCH(Me)	CH ₂ O-N=CH	O-N=C(Me)
CH=C(Me)	CH(Me)CH(Me)	CH ₂ S	CH ₂ O-N=C(Me)	CH ₂ OC(=O)
C(Me)=C(Me)	CH ₂ O	CH(Me)S	CH=N-O	CH(Me)OC(=O)
direct bond	C≡C			

A = NMe

<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
S	CH ₂ CH ₂	CH(Me)O	SCH ₂	C(Me)=N-O
CH=CH	CH(Me)CH ₂	OCH ₂	SCH(Me)	O-N=CH
C(Me)=CH	CH ₂ CH(Me)	OCH(Me)	CH ₂ O-N=CH	O-N=C(Me)
CH=C(Me)	CH(Me)CH(Me)	CH ₂ S	CH ₂ O-N=C(Me)	CH ₂ OC(=O)
C(Me)=C(Me)	CH ₂ O	CH(Me)S	CH=N-O	CH(Me)OC(=O)
direct bond	C≡C			

Table 15

Compounds of Formula I wherein: G = C, W = O, X = MeO, R² = Me, R³ = R⁴ = H, the floating double bond is attached to G, and

Y = O, A = O

<u>Z</u>	<u>Z</u>	<u>Z</u>	<u>Z</u>
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂
2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph
c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinylloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienylloxy-Ph	4-(3-Cl-2-pyridinylloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4-(PhO)-c-hexyl

CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl
2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl
3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl
3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

Y = CH₂O, A = O

Z	Z	Z	Z
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂
2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph
c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinylloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienylloxy-Ph	4-(3-Cl-2-pyridinylloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4-(PhO)-c-hexyl
CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl
2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl

3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl
3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

Y = O, A = NMe

<u>Z</u>	<u>Z</u>	<u>Z</u>	<u>Z</u>
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂
2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph
c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinylloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienylloxy-Ph	4-(3-Cl-2-pyridinylloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4-(PhO)-c-hexyl
CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl
2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl
3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl
3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

$Y = CH_2O$, $A = NMe$

<u>Z</u>	<u>Z</u>	<u>Z</u>	<u>Z</u>
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂
2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph
c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinylloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienylloxy-Ph	4-(3-Cl-2-pyridinylloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4-(PhO)-c-hexyl
CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl
2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl
3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl
3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

Table 16

Compounds of Formula I wherein: A = O, G = C, W = O, X = MeO, R² = Me, R³ = R⁴ = H, the floating double bond is attached to G, and

$Y = CH_2ON=C(CH_3)_2$

<u>Z</u>	<u>Z</u>	<u>Z</u>	<u>Z</u>
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂

2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph
c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinylloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienylloxy-Ph	4-(3-Cl-2-pyridinylloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4(PhO)-c-hexyl
CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl
2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl
3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl
3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

Table 17

Compounds of Formula I wherein: A = NMe, G = C, W = O, X = MeO, R² = Me, R³ = R⁴ = H, the floating double bond is attached to G, and

Y = CH₂ON=C(CH₃).

<u>Z</u>	<u>Z</u>	<u>Z</u>	<u>Z</u>
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂
2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph

c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinyloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienyloxy-Ph	4-(3-Cl-2-pyridinyloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4-(PhO)-c-hexyl
CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl
2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl
3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl
3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

Table 18

Compounds of Formula I wherein: A = N, G = N, W = O, X = MeO, R² = Me, R³ = R⁴ = H, the floating double bond is attached to A, and

Y = CH₂ON=C(CH₃)₂

<u>Z</u>	<u>Z</u>	<u>Z</u>	<u>Z</u>
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂
2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph
c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinyloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienyloxy-Ph	4-(3-Cl-2-pyridinyloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4-(PhO)-c-hexyl
CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl

2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl
3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl
3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

Y = CH₂S.

Z	Z	Z	Z
hexyl	4-octenyl	3-pentynyl	4-PhO-2-pyridinyl
PhO(CH ₂) ₃	PhCH=CHCH ₂	PhC≡CCH ₂	(c-propyl)CH ₂
2-Br-Ph	2-Me-Ph	2-Et-Ph	6-(2-CN-PhO)-4-pyrimidinyl
2-CN-Ph	2-F-Ph	2-Cl-Ph	6-PhO-4-pyrimidinyl
2,4-diCl-Ph	2-Me-4-Cl-Ph	2,4,6-triCl-Ph	4-EtO-2-pyrimidinyl
2-CF ₃ -Ph	4-Ph-Ph	3-PhO-Ph	3-(4-pyrimidinylloxy)-Ph
2-I-Ph	3-(2-Cl-PhO)-Ph	3-(2-Et-PhO)-Ph	4-(2-thienyl)Ph
c-hexyl	3,5-diCl-Ph	6-Ph-2-pyridinyl	3-(2-pyridinylloxy)Ph
4-NO ₂ -Ph	3,5-diCF ₃ -Ph	6-PhO-4-pyridinyl	3-pyridinyl
PhCH ₂ CH ₂	2-MeO-Ph	3-thienylloxy-Ph	4-(3-Cl-2-pyridinylloxy)-Ph
(2-CN-Ph)CH ₂	2,6-diMeO-Ph	3-(4-CF ₃ -PhO)-Ph	4(PhO)-c-hexyl
CF ₃ CH ₂	3-(2-CN-PhO)-Ph	3-(2-Me-PhO)-Ph	5-PhO-2-pyrimidinyl
2-MeS-Ph	5-PhO-3-pyridinyl	5-PhO-2-pyridinyl	6-(2-NO ₂ -PhO)-4-pyrimidinyl
i-Bu	6-Me-2-pyridinyl	6-PhO-2-pyridinyl	6-(2-Cl-PhO)-4-pyrimidinyl
2-CF ₃ O-Ph	3-CF ₃ O-Ph	6-CF ₃ -2-pyridinyl	6-(2-CF ₃ -PhO)-4-pyrimidinyl
4-Me-Ph	4-Br-Ph	6-PhO-3-pyridinyl	4,6-diMeO-2-pyrimidinyl
4-Cl-Ph	3-Et-Ph	2-pyrimidinyl	4,6-diMe-2-pyrimidinyl
3-Me-Ph	4-Et-Ph	4-pyrimidinyl	6-CF ₃ -4-pyrimidinyl
3-CF ₃ -Ph	4-MeO-Ph	4-MeO-2-pyrimidinyl	4-CF ₃ -2-pyridinyl
3-Cl-2-Me-Ph	4-t-Bu-Ph	4-Me-2-pyrimidinyl	4-CF ₃ -2-pyrimidinyl

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3-t-Bu-Ph	4-CN-Ph	6-MeO-4-pyrimidinyl	2-pyridinyl
3-NO ₂ -Ph	4-NO ₂ -Ph	2-Ph-4-thiazolyl	6-CF ₃ -2-pyrazinyl
3-F-Ph	4-F-Ph	3-MeO-6-pyridazinyl	5-CF ₃ -3-pyridinyl
4-CF ₃ -Ph	3-Ph-Ph	5-Me-2-furanyl	3-MeO-2-pyridinyl
3,4-diCl-Ph	3,4-diMe-Ph	2,5-diMe-3-thienyl	5-CN-2-pyridinyl
3,4-diCF ₃ -Ph	3,5-diMe-Ph	3-OCF ₂ H-Ph	6-Me-2-pyridinyl
3-EtO-Ph	3-MeS-Ph	4-OCF ₂ H-Ph	

Table 19

Compounds of Formula I wherein: A = N, G = N, W = O, X = MeO, R² = Me, R³ = R⁴ = H, the floating double bond is attached to A, and

Y = CH₂ON=C(H).

<u>Z</u>	<u>Z</u>	<u>Z</u>	<u>Z</u>
2-Me-Ph	3-Me-Ph	3-CF ₃ -Ph	3-Cl-Ph
4-Cl-Ph	4-CF ₃ -Ph	2,5-diMe-Ph	3,5-diCl-Ph

Table 20

Compounds of Formula I wherein: A = N, G = N, W = O, X = MeO, Z = 3-CF₃-Ph, R² = Me, R³ = R⁴ = H, the floating double bond is attached to A, and

Y = CH₂ON=C(R⁷).

<u>R⁷</u>	<u>R⁷</u>	<u>R⁷</u>	<u>R⁷</u>
CF ₃	OCH ₂ CF ₃	Et	n-Pr
Cl	MeO	EtO	MeS

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Table 21

Compounds of Formula I wherein: A = O, G = C, W = O, X = MeO, R³ = R⁴ = H, Y = CH₂ON=C(R⁷), the floating double bond is attached to G, and

R² = Me

<u>R⁷</u>	<u>Z</u>	<u>R⁷</u>	<u>Z</u>
c-propyl	3,4-(OCH ₂ CH ₂ O)-Ph	c-propyl	3,4-(OCHFCH ₂ O)-Ph
c-propyl	3,4-(OCF ₂ O)-Ph	c-propyl	Ph
c-propyl	4-CF ₃ -Ph	c-propyl	3-CF ₃ -Ph
c-propyl	4-Cl-Ph	c-propyl	3-Cl-Ph
c-propyl	2-Me-Ph	c-propyl	3-OCF ₃ -Ph
CF ₃	3,4-(OCH ₂ CH ₂ O)-Ph	CF ₃	3,4-(OCHFCH ₂ O)-Ph
CF ₃	3,4-(OCF ₂ O)-Ph	CF ₃	Ph
CF ₃	4-CF ₃ -Ph	CF ₃	3-CF ₃ -Ph
CF ₃	4-Cl-Ph	CF ₃	3-Cl-Ph

CF ₃	2-Me-Ph	CF ₃	3-OCF ₃ -Ph
Et	3,4-(OCH ₂ CH ₂ O)-Ph	Et	3,4-(OCHFCH ₂ O)-Ph
Et	3,4-(OCF ₂ O)-Ph	Et	Ph
Et	4-CF ₃ -Ph	Et	3-CF ₃ -Ph
Et	4-Cl-Ph	Et	3-Cl-Ph
Et	2-Me-Ph	Et	3-OCF ₃ -Ph

Table 22

Compounds of Formula I wherein: A = NMe, G = C, W = O, X = MeO, R³ = R⁴ = H, Y = CH₂ON=C(R⁷), the floating double bond is attached to G, and

R² = Me

<u>R⁷</u>	<u>Z</u>	<u>R⁷</u>	<u>Z</u>
c-propyl	3,4-(OCH ₂ CH ₂ O)-Ph	c-propyl	3,4-(OCHFCH ₂ O)-Ph
c-propyl	3,4-(OCF ₂ O)-Ph	c-propyl	Ph
c-propyl	4-CF ₃ -Ph	c-propyl	3-CF ₃ -Ph
c-propyl	4-Cl-Ph	c-propyl	3-Cl-Ph
c-propyl	2-Me-Ph	c-propyl	3-OCF ₃ -Ph
CF ₃	3,4-(OCH ₂ CH ₂ O)-Ph	CF ₃	3,4-(OCHFCH ₂ O)-Ph
CF ₃	3,4-(OCF ₂ O)-Ph	CF ₃	Ph
CF ₃	4-CF ₃ -Ph	CF ₃	3-CF ₃ -Ph
CF ₃	4-Cl-Ph	CF ₃	3-Cl-Ph
CF ₃	2-Me-Ph	CF ₃	3-OCF ₃ -Ph
Et	3,4-(OCH ₂ CH ₂ O)-Ph	Et	3,4-(OCHFCH ₂ O)-Ph
Et	3,4-(OCF ₂ O)-Ph	Et	Ph
Et	4-CF ₃ -Ph	Et	3-CF ₃ -Ph
Et	4-Cl-Ph	Et	3-Cl-Ph
Et	2-Me-Ph	Et	3-OCF ₃ -Ph

Table 23

Compounds of Formula I wherein: A = N, G = N, W = O, X = MeO, R³ = R⁴ = H, Y = CH₂ON=C(R⁷), the floating double bond is attached to A, and

R² = Me

<u>R⁷</u>	<u>Z</u>	<u>R⁷</u>	<u>Z</u>
c-propyl	3,4-(OCH ₂ CH ₂ O)-Ph	c-propyl	3,4-(OCHFCH ₂ O)-Ph
c-propyl	3,4-(OCF ₂ O)-Ph	c-propyl	Ph
c-propyl	4-CF ₃ -Ph	c-propyl	3-CF ₃ -Ph
c-propyl	4-Cl-Ph	c-propyl	3-Cl-Ph
c-propyl	2-Me-Ph	c-propyl	3-OCF ₃ -Ph

CF ₃	3,4-(OCH ₂ CH ₂ O)-Ph	CF ₃	3,4-(OCHFCH ₂ O)-Ph
CF ₃	3,4-(OCF ₂ O)-Ph	CF ₃	Ph
CF ₃	4-CF ₃ -Ph	CF ₃	3-CF ₃ -Ph
CF ₃	4-Cl-Ph	CF ₃	3-Cl-Ph
CF ₃	2-Me-Ph	CF ₃	3-OCF ₃ -Ph
Et	3,4-(OCH ₂ CH ₂ O)-Ph	Et	3,4-(OCHFCH ₂ O)-Ph
Et	3,4-(OCF ₂ O)-Ph	Et	Ph
Et	4-CF ₃ -Ph	Et	3-CF ₃ -Ph
Et	4-Cl-Ph	Et	3-Cl-Ph
Et	2-Me-Ph	Et	3-OCF ₃ -Ph

Table 24

Compounds of Formula I wherein: A = O, G = C, W = O, X = MeO, R³ = R⁴ = H, the floating double bond is attached to G, and
R² = Me

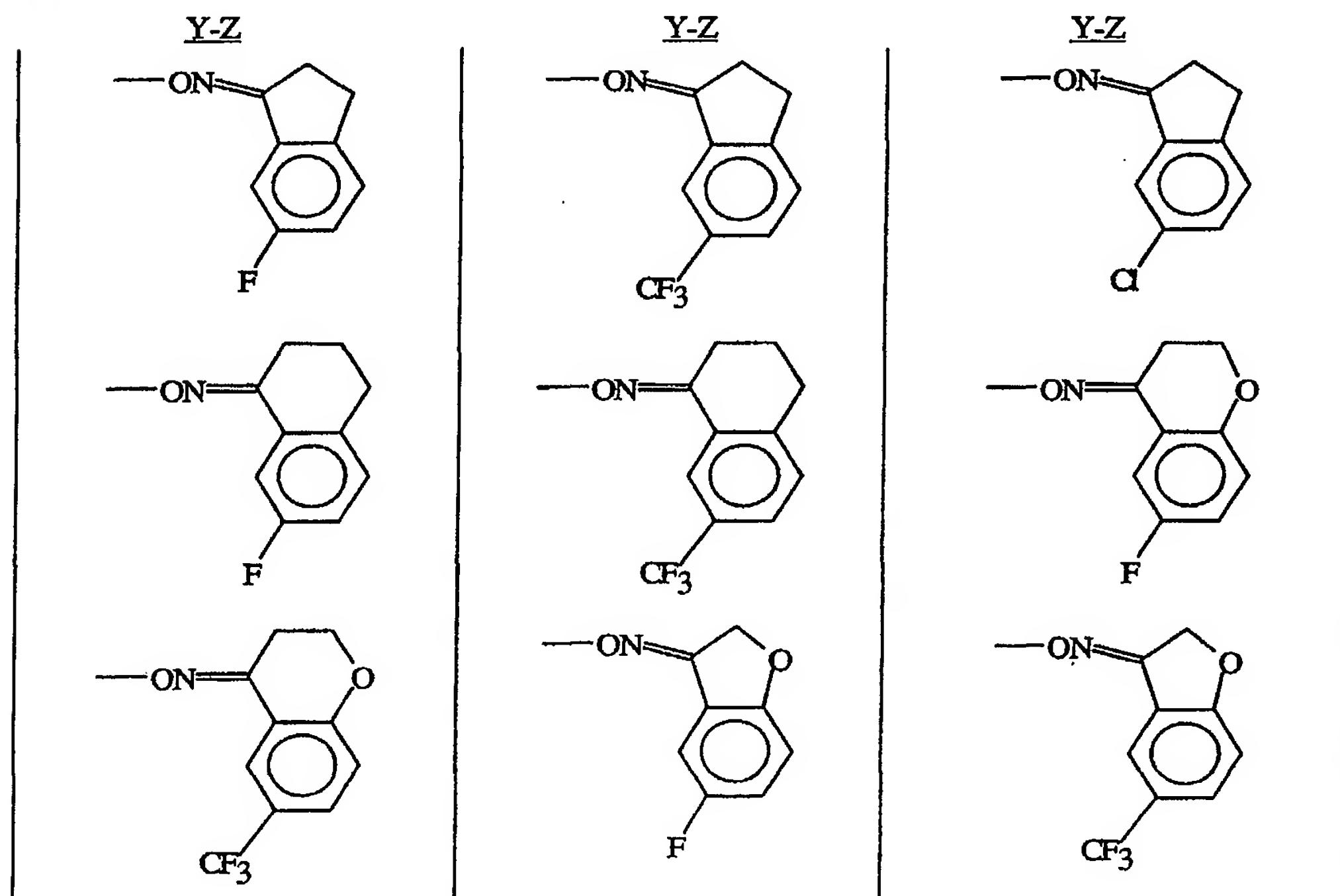


Table 25

Compounds of Formula I wherein: A = NMe, G = C, W = O, X = MeO, $R^3 = R^4 = H$,
the floating double bond is attached to G, and
 $R^2 = Me$

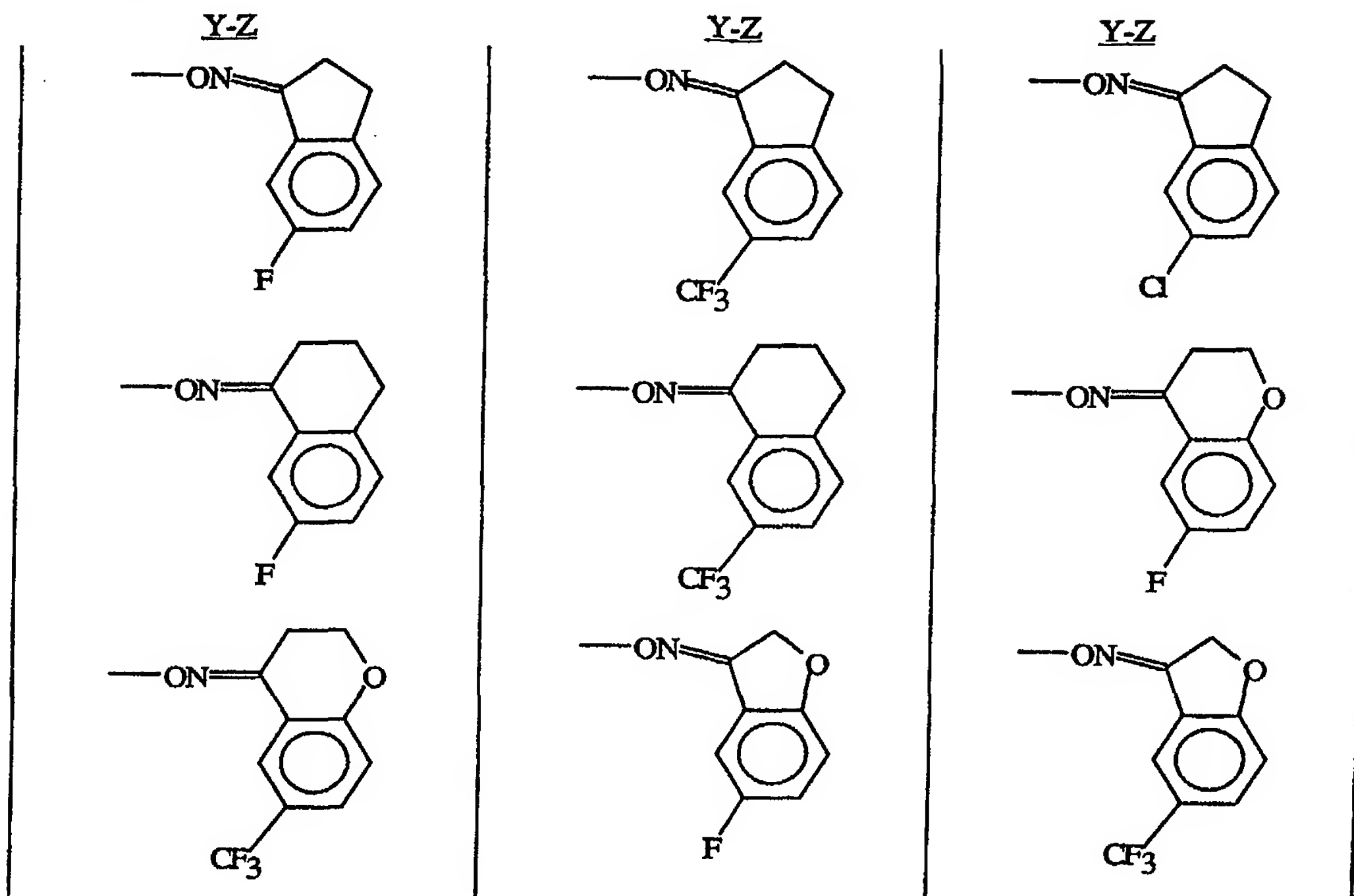
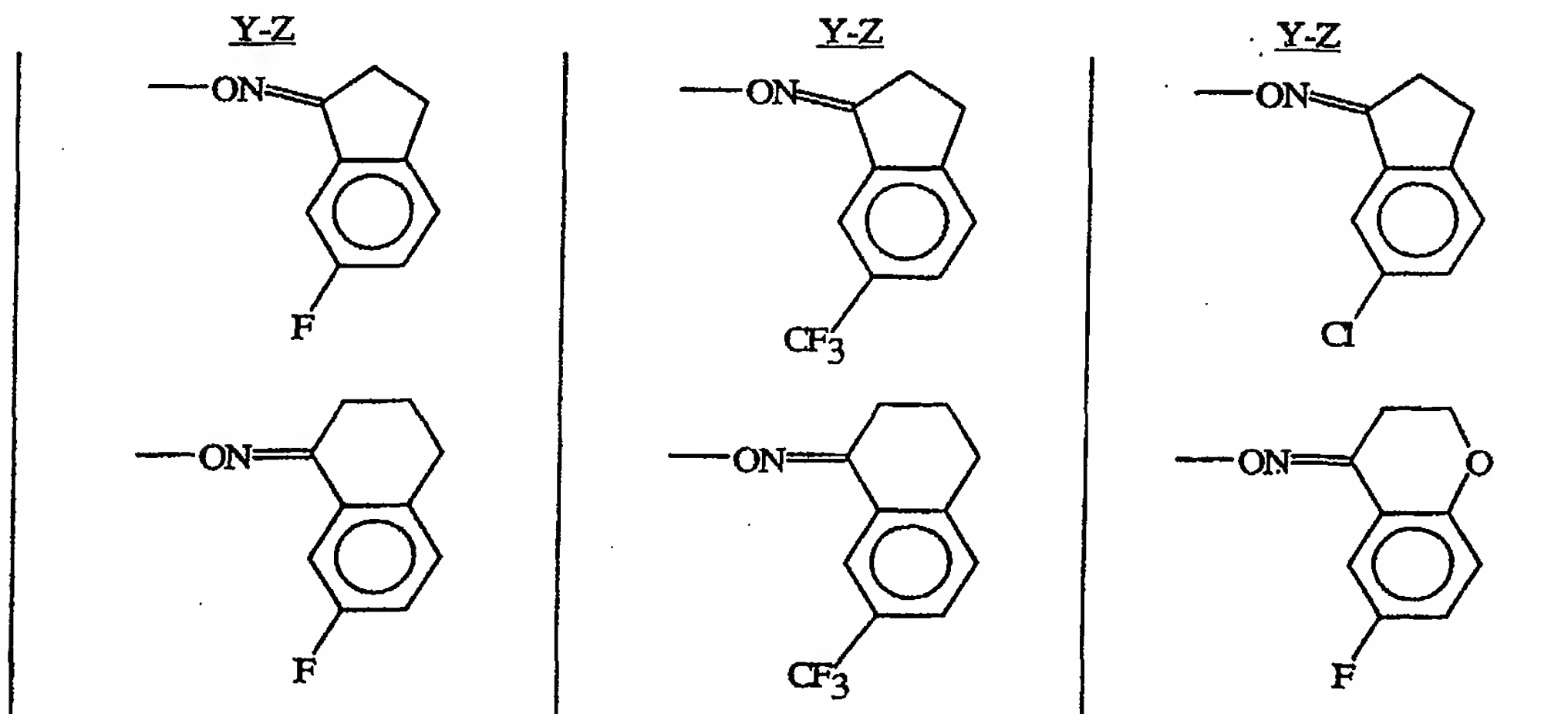
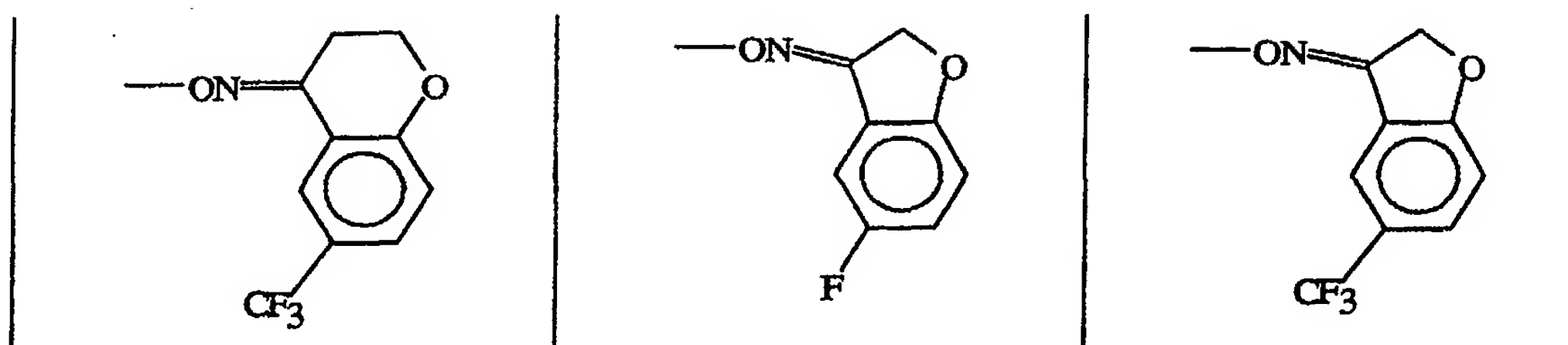


Table 26

Compounds of Formula I wherein: A = N, G = N, W = O, X = MeO, $R^3 = R^4 = H$, the
floating double bond is attached to A, and
 $R^2 = Me$



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Formulation/Utility

Compounds of this invention will generally be used in formulation with an agriculturally suitable composition. The fungicidal compositions of the present invention comprise an effective amount of at least one compound of Formula I as defined above and at least one of (a) a surfactant, (b) an organic solvent, and (c) at least one solid or liquid diluent. Useful formulations can be prepared in conventional ways. They include dusts, granules, pellets, solutions, suspensions, emulsions, wettable powders, emulsifiable concentrates, dry flowables and the like. Sprayable formulations can be extended in suitable media and used at spray volumes from about one to several hundred liters per hectare. High strength compositions are primarily used as intermediates for further formulation. The formulations will typically contain effective amounts of active ingredient, diluent and surfactant within the following approximate ranges which add up to 100 weight percent.

	Weight Percent		
	<u>Active Ingredient</u>	<u>Diluent</u>	<u>Surfactant</u>
Wettable Powders	5-90	0-74	1-10
Oil Suspensions, Emulsions, Solutions, (including Emulsifiable Concentrates)	5-50	40-95	0-15
Dusts	1-25	70-99	0-5
Granules, Baits and Pellets	0.01-99	5-99.99	0-15
High Strength Compositions	90-99	0-10	0-2

Typical solid diluents are described in Watkins, et al., *Handbook of Insecticide Dust Diluents and Carriers*, 2nd Ed., Dorland Books, Caldwell, New Jersey. Typical liquid diluents and solvents are described in Marsden, *Solvents Guide*, 2nd Ed., Interscience, New York, (1950). *McCutcheon's Detergents and Emulsifiers Annual*, Allured Publ. Corp., Ridgewood, New Jersey, as well as Sisely and Wood, *Encyclopedia of Surface Active Agents*, Chemical Publ. Co., Inc., New York, (1964), list surfactants and recommended uses. All formulations can contain minor amounts of additives to reduce foam, caking, corrosion, microbiological growth, and the like.

Methods for formulating such compositions are well known. Solutions are prepared by simply mixing the ingredients. Fine solid compositions are made by blending and, usually, grinding as in a hammer mill or fluid energy mill. Water-dispersible granules can be produced by agglomerating a fine powder composition; see for example, 5 Cross et al., *Pesticide Formulations*, Washington, D.C., (1988), pp 251-259. Suspensions are prepared by wet-milling; see, for example, U.S. 3,060,084. Granules and pellets can be made by spraying the active material upon preformed granular carriers or by agglomeration techniques. See Browning, "Agglomeration", *Chemical Engineering*, December 4, 1967, pp 147-148, *Perry's Chemical Engineer's Handbook*, 10 4th Ed., McGraw-Hill, New York, (1963), pp 8-57 and following, and WO 91/13546. Pellets can be prepared as described in U.S. 4,172,714. Water-dispersible and water-soluble granules can be prepared as taught in DE 3,246,493.

For further information regarding the art of formulation, see U.S. 3,235,361, Col. 6, line 16 through Col. 7, line 19 and Examples 10 through 41; U.S. 3,309,192, Col. 5, 15 line 43 through Col. 7, line 62 and Examples 8, 12, 15, 39, 41, 52, 53, 58, 132, 138-140, 162-164, 166, 167 and 169-182; U.S. 2,891,855, Col. 3, line 66 through Col. 5, line 17 and Examples 1-4; Klingman, *Weed Control as a Science*, John Wiley and Sons, Inc., New York, (1961), pp 81-96; and Hance et al., *Weed Control Handbook*, 8th Ed., Blackwell Scientific Publications, Oxford, (1989).

20 In the following Examples, all percentages are by weight and all formulations are prepared in conventional ways. Compound 1 refers to the compound in Index Table A hereinafter.

Example A

Wettable Powder

25	Compound 1	65.0%
	dodecylphenol polyethylene glycol ether	2.0%
	sodium ligninsulfonate	4.0%
	sodium silicoaluminate	6.0%
	montmorillonite (calcined)	23.0%.

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Example B

Granule

	Compound 1	10.0%
	attapulgate granules (low volatile matter, 0.71/0.30 mm; U.S.S. No. 25-50 sieves)	90.0%.

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Example C

Extruded Pellet

	Compound 1	25.0%
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anhydrous sodium sulfate	10.0%
crude calcium ligninsulfonate	5.0%
sodium alkyl naphthalenesulfonate	1.0%
calcium/magnesium bentonite	59.0%.

5

Example DEmulsifiable Concentrate

Compound 1	20.0%
blend of oil soluble sulfonates and polyoxyethylene ethers	10.0%
isophorone	70.0%.

10

The compounds of this invention are useful as plant disease control agents. The present invention therefore further comprises a method for controlling plant diseases caused by fungal plant pathogens comprising applying to the plant or portion thereof, or to the plant seed or seedling, an effective amount of a compound of Formula I or a fungicidal composition containing said compound. The compounds and compositions of this invention provide control of diseases caused by a broad spectrum of fungal plant pathogens in the Basidiomycete, Ascomycete, Oomycete and Deuteromycete classes. They are effective in controlling a broad spectrum of plant diseases, particularly foliar pathogens of ornamental, vegetable, field, cereal, and fruit crops. These pathogens include *Plasmopara viticola*, *Phytophthora infestans*, *Peronospora tabacina*, *Pseudoperonospora cubensis*, *Pythium aphanidermatum*, *Alternaria brassicae*, *Septoria nodorum*, *Cercosporidium personatum*, *Cercospora arachidicola*, *Pseudocercospora herpotrichoides*, *Cercospora beticola*, *Botrytis cinerea*, *Monilinia fructicola*, *Pyricularia oryzae*, *Podosphaera leucotricha*, *Venturia inaequalis*, *Erysiphe graminis*, *Uncinula necator*, *Puccinia recondita*, *Puccinia graminis*, *Hemileia vastatrix*, *Puccinia striiformis*, *Puccinia arachidis*, *Rhizoctonia solani*, *Sphaerotheca fuliginea*, *Fusarium oxysporum*, *Verticillium dahliae*, *Pythium aphanidermatum*, *Phytophthora megasperma* and other genera and species closely related to these pathogens.

20

Compounds of this invention can also be mixed with one or more other insecticides, fungicides, nematocides, bactericides, acaricides, semiochemicals, repellants, attractants, pheromones, feeding stimulants or other biologically active compounds to form a multi-component pesticide giving an even broader spectrum of agricultural protection. Examples of other agricultural protectants with which compounds of this invention can be formulated are: insecticides such as acephate, avermectin B, azinphosmethyl, bifenthrin, bifenox, buprofezin, carbofuran, chlordane, chlorpyrifos, cyfluthrin, deltamethrin, diazinon, diflubenzuron, dimethoate, esfenvalerate, fenpropathrin, fenvalerate, fipronil, flucythrinate, flufenprox, fluvalinate, fonophos, isofenphos, malathion, metaldehyde, methidathion, methomyl,

35

methoprene, methoxychlor, monocrotophos, oxamyl, parathion-methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb, profenofos, rotenone, sulprofos, terbufos, tetrachlorvinphos, thiodicarb, tralomethrin, trichlorfon and triflumuron; fungicides such as benomyl, blasticidin S, bromuconazole, captafol, captan, carbendazim, chloroneb, chlorothalonil, copper oxychloride, copper salts, cymoxanil, cyproconazole, dichloran, diclobutrazol, diclomezine, difenoconazole, diniconazole, dodine, edifenphos, epoxyconazole fenarimol, fenbuconazole, fenpropidine, fenpropimorph, fluquinconazole, flusilazol, flutolanil, flutriafol, folpet, furalaxyl, hexaconazole, ipconazole, iprobenfos, iprodione, isoprothiolane, kasugamycin, mancozeb, maneb, mepronil, metalaxyl, metconazole, myclobutanil, neo-asozin, oxadixyl, penconazole, pencycuron, phosethyl-Al, probenazole, prochloraz, propiconazole, pyrifenox, pyroquilon, sulfur, tebuconazole, tetraconazole, thiabendazole, thiophanate-methyl, thiuram, triadimefon, triadimenol, tricyclazole, uniconazole, validamycin and vinclozolin; nematocides such as aldoxycarb, fenamiphos and fosthietan; bactericides such as oxytetracycline, streptomycin and tribasic copper sulfate; acaricides such as amitraz, binapacryl, chlorobenzilate, cyhexatin, dicofol, dienochlor, fenbutatin oxide, hexythiazox, oxythioquinox, propargite and tebufenpyrad; and biological agents such as *Bacillus thuringiensis* and baculovirus.

In certain instances, combinations with other fungicides having a similiar spectrum of control but a different mode of action will be particularly advantageous for resistance management.

Plant disease control is ordinarily accomplished by applying an effective amount of a compound of this invention either pre- or post-infection, to the portion of the plant to be protected such as the roots, stems, foliage, fruit, seeds, tubers or bulbs, or to the media (soil or sand) in which the plants to be protected are growing. The compounds can also be applied to the seed to protect the seed and seedling.

Rates of application for these compounds can be influenced by many factors of the environment and should be determined under actual use conditions. Foliage can normally be protected when treated at a rate of from less than 1 g/ha to 5,000 g/ha of active ingredient. Seed and seedlings can normally be protected when seed is treated at a rate of from 0.1 to 10 g per kilogram of seed.

The following TESTS demonstrate the control efficacy of compounds of this invention on specific pathogens. The pathogen control protection afforded by the compounds is not limited, however, to these species. See Index Tables A-D for compound descriptions.

Test compounds were first dissolved in acetone in an amount equal to 3% of the final volume and then suspended at a concentration of 200 ppm in purified water containing 250 ppm of the surfactant Trem[®] 014 (polyhydric alcohol esters). The resulting test suspensions were then used in the following tests.

5

TEST A

The test suspension was sprayed to the point of run-off on wheat seedlings. The following day the seedlings were inoculated with a spore dust of *Erysiphe graminis* f. sp. *tritici*, (the causal agent of wheat powdery mildew) and incubated in a growth chamber at 20°C for 7 days, after which disease ratings were made.

10

TEST B

The test suspension was sprayed to the point of run-off on wheat seedlings. The following day the seedlings were inoculated with a spore suspension of *Puccinia recondita* (the causal agent of wheat leaf rust) and incubated in a saturated atmosphere at 20°C for 24 h, and then moved to a growth chamber at 20°C for 6 days, after which disease ratings were made.

15

TEST C

The test suspension was sprayed to the point of run-off on rice seedlings. The following day the seedlings were inoculated with a spore suspension of *Pyricularia oryzae* (the causal agent of rice blast) and incubated in a saturated atmosphere at 27°C for 24 h, and then moved to a growth chamber at 30°C for 5 days, after which disease ratings were made.

20

TEST D

The test suspension was sprayed to the point of run-off on tomato seedlings. The following day the seedlings were inoculated with a spore suspension of *Phytophthora infestans* (the causal agent of potato and tomato late blight) and incubated in a saturated atmosphere at 20°C for 24 h, and then moved to a growth chamber at 20°C for 5 days, after which disease ratings were made.

25

TEST E

The test suspension was sprayed to the point of run-off on grape seedlings. The following day the seedlings were inoculated with a spore suspension of *Plasmopara viticola* (the causal agent of grape downy mildew) and incubated in a saturated atmosphere at 20°C for 24 h, moved to a growth chamber at 20°C for 6 days, and then incubated in a saturated atmosphere at 20°C for 24 h, after which disease ratings were made.

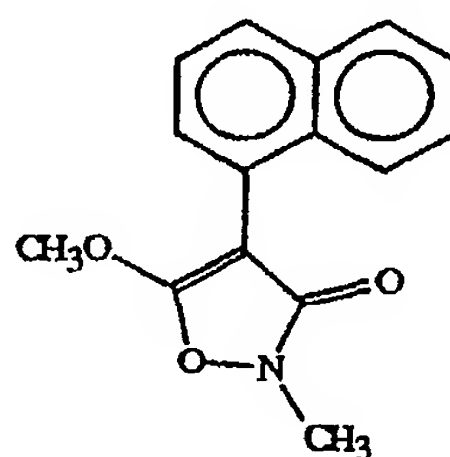
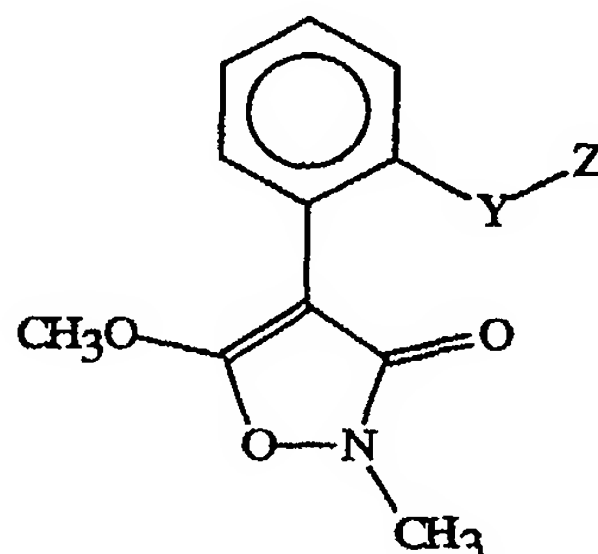
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TEST F

The test suspension was sprayed to the point of run-off on cucumber seedlings. The following day the seedlings were inoculated with a spore suspension of *Botrytis cinerea* (the causal agent of gray mold on many crops) and incubated in a saturated atmosphere at 20°C for 48 h, and moved to a growth chamber at 20°C for 5 days, after which disease ratings were made.

INDEX TABLE A

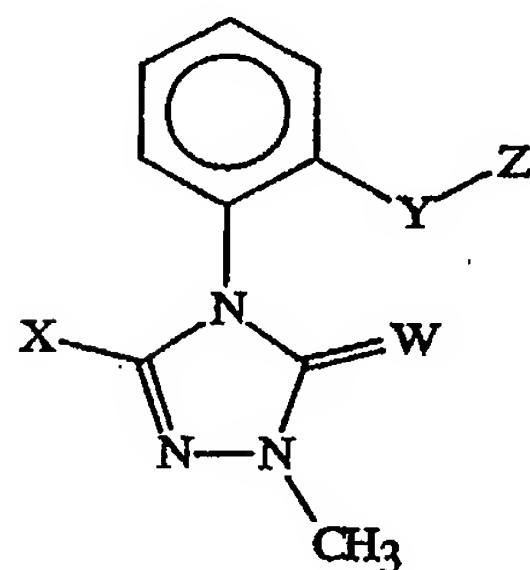
Compound	m.p. (°C)
1	117-120

INDEX TABLE B

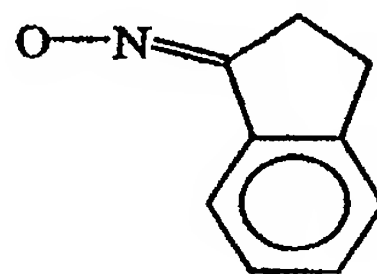
Compound	Y	Z	m.p. (°C)
2	O	2-Me-Ph	oil*
3	O	CH ₂ -Ph	oil*
4	-	Me	oil*
5	CH ₂ O	2-Me-Ph	oil*

* See Index Table D for ¹H NMR data.

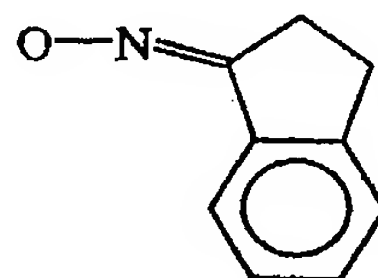
INDEX TABLE C



Compound	W	X	Y	Z	m.p. (°C)
6	O	MeS	O	Ph	129-130
7	O	MeO	O	Me	123-126
8	O	MeO	-	Me	95-97
9	O	MeS	-	Me	95-97
10	O	Cl	-	Me	99-100
11	O	MeO	O	Ph	88-91
12	O	Cl	O	2-Me-Ph	88-96
13	O	MeO	CH ₂ O	2-Me-Ph	110-113
14	O	EtO	CH ₂ O	2-Me-Ph	oil*
15	O	MeS	CH ₂ O	2-Me-Ph	80-88
16	O	OCH ₂ C≡CH	CH ₂ O	2-Me-Ph	122-130
17	O	Cl	CH ₂ ON=C(Me)	4-Me-Ph	oil*
18	O	MeO	CH ₂ ON=C(Me)	4-Me-Ph	116-118
19	O	MeS	CH ₂ ON=C(Me)	4-Me-Ph	oil*
20	O	Cl			oil

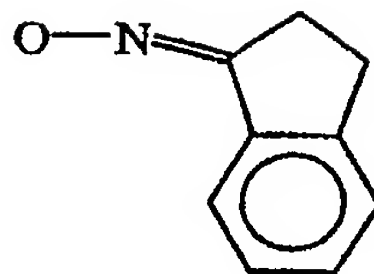


21	S	MeS	O	Ph	oil*
22	O	MeO			126-130



23	O	Cl	CH ₂ ON=C(H)	Ph	oil*
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63

24	O	MeS				oil*
25	O	Cl	CH ₂ O	3-(OPh)-Ph		oil*
26	O	MeO	CH ₂ O	3-(OPh)-Ph		oil*
27	O	MeO	CH ₂ ON=C(H)	Ph		101-104
28	O	MeS	CH ₂ O	3-(OPh)-Ph		95-100
29	O	Cl	CH ₂ S	2-Me-Ph		106-109
30	O	MeO	CH ₂ S	2-Me-Ph		115-118
31	O	MeS	CH ₂ S	2-Me-Ph		82-86
32	O	Cl	CH ₂ S	2-benzthiazole		95-97
33	O	MeO	C≡C	Ph		164-166
34	O	MeO	CH ₂ ON=C(Me)	4-Br-Ph		115-120
35	O	Cl	CH ₂ ON=C(Me)	4-Br-Ph		gum*
36	O	Cl	CH ₂ O	3-(benzoyl)-Ph		oil*
37	O	MeS	CH ₂ ON=C(Me)	4-Br-Ph		117-122
38	O	MeO	CH ₂ O	3-(benzoyl)-Ph		oil*
39	O	Cl	CH=NOCH ₂	4-Cl-Ph		oil*
40	O	Cl	CH ₂ ON=C(Me)	3-piperonyl		oil*
41	O	MeO	CH=NOCH ₂	4-Cl-Ph		oil*
42	O	MeO	CH ₂ ON=C(Me)	3-piperonyl		oil*
43	O	Cl	O	4-(6-OPh)-1,3-pyrimidine		oil*
44	O	MeO	CH ₂ S	2-benzthiazole		95-97
45	O	MeO	CH ₂ ON=C(Me)	2-Me-Ph		oil*
46	O	MeO	CH ₂ ON=C(Me)	4-CF ₃ -Ph		138-144
47	O	MeO	CH ₂ ON=C(Me)	Ph		oil*
48	O	MeO	CH ₂ ON=C(Me)	Ph		oil*
49	O	MeO	CH ₂ ON=C(Me)	3-Me-Ph		oil*
50	O	MeO	CH ₂ ON=C(Me)	4-MeO-Ph		oil*
51	O	MeO	CH ₂ ON=C(Me)	3-Cl-Ph		oil*
52	O	MeO	CH=NOCH(Me)	Ph		oil*
53	O	MeO	CH=NOCH ₂	2-Me-Ph		oil*

* See Index Table D for ¹H NMR data.

INDEX TABLE D

Cmpd No.	¹ H NMR Data (200 MHz, CDCl ₃ solution)
2	δ 7.51(dd,1H),7.27(dt,1H),7.17(m,2H),6.97(dd,1h),6.6(m,3H),3.92(s,3H), 3.74(s,3H),3.33(s,3H)
3	δ 7.32(m,7H), 6.99(m,2H),5.08(s,2H),3.84(s,3H),3.42(s,3H)
4	δ 7.25(m,4H),3.98(s,3H),3.45(s,3H),2.30(s,3H)
5	δ 7.61(d,1H),7.35(m,3H),7.11(m,2H),6.84(t,2H),5.12(s,2H),3.96(s,3H), 3.415(s,3H),2.24(s,3H)
14	δ 7.65(d,1H),7.45(m,2H),7.23(m,1H),7.10(m,2H),6.82(t,1H),6.78(d,1H), 5.08(s,2H),4.29(m,2H),3.41(s,3H),2.24(s,3H),1.31(t,3H)
17	δ 7.6-7.45(m,5H),7.20(m,1H),7.14(d,2H),5.27(d,1H),5.16(d,1H), 3.46(s,3H),2.34(s,3H),2.16(s,3H)
19	δ 7.6(d,1H),7.5(m,3H),7.4(t,1H),7.25(m,1H),7.15(d,2H),5.26(d,1H), 5.20(d,1H),3.48(s,3H),2.41(s,3H),2.43(s,3H),2.18(s,3H)
20	δ 7.62(m,2H),7.5(m,2H),7.35-7.2(m,4H),5.25(d,1H),5.15(d,1H), 3.48(s,3H),3.02(m,2H),2.85(m,2H)
21	δ 7.42(m,2H),7.10(m,1H),7.06(m,3H),6.99(t,1H),6.68(d,2H),3.37(s,3H), 2.51(s,3H)
23	δ 8.01(s,1H),7.61(d,1H),7.52(m,4H),7.35(m,3H),7.25(d,1H),5.23(d,1H), 5.15(d,1H),3.49(s,3H)
24	δ 7.6(m,2H),7.5-7.4(m,3H),7.3-7.2(m,3H),5.24(d,1H),5.20(d,1H), 3.48(s,3H),2.40(s,3H)
25	δ 7.6-7.4(m,4H),7.35(m,2H),7.2(m,2H),7.0(d,2H),6.6(m,3H),5.04(d,1H), 5.00(d,1H),3.45(s,3H)
26	δ 7.6(d,1H),7.45(m,2H),7.33(t,2H),7.19(m,2H),7.10(t,1H),7.01(d,2H), 6.6(m,3H),5.03(m,2H),3.87(s,3H),3.39(s,3H)
35	δ 7.6-7.4(m,7H),7.23(d,1H),5.28(d,1H),5.17(d,1H),3.46(s,3H),2.14(s,3H)
36	δ 7.80(d,2H),7.65-7.45(m,6H),7.36(d,2H),7.30(m,1H),7.25(m,1H), 7.10(t,1H),5.15(d,1H),5.10(d,1H),3.45(s,2H)
38	δ 7.77(d,2H),7.6(m,2H),7.47(m,4H),7.35(m,3H),7.25(m,1H),7.10 (m,1H), 5.13(d,1H),5.12(d,1H),3.89(s,3H),3.38(s,3H)
39	δ 8.03(s,1H),7.70(d,1H),7.53(m,2H),7.35-7.25(m,5H),5.06(s,2H), 3.46(s,3H)
40	δ 7.6-7.5(m,3H),7.24(m,1H),7.13(s,1H),7.02(d,1H),6.78(d,1H),5.96(s,2H), 5.26(d,1H),5.14(d,1H),3.48(s,3H),2.13(s,3H)
41	δ 8.04(s,1H),7.8(m,1H),7.45(m,2H)7.35-7.25(m,5H),5.10(s,2H),3.86(s,3H), 3.41(s,3H)
42	δ 7.58(m,1H),7.43(m,2H),7.25(m,1H),7.15(m,1H),7.02(d,1H),6.76(d,1H),

	5.96(s,2H),5.22(d,1H),5.18(d,1H)3.89(s,3H),3.42(s,3H),2.15(s,3H)
43	δ 8.40(s,1H),7.6(m,1H),7.5-7.4(m,5H),7.3(d,1H),7.18(m,2H),6.38(s,1H), 3.45(s,3H)
45	δ 7.55(d,1H),7.40(m,3H),7.20(m,4H),5.21(d,1H),3.87(s,3H),3.42(s,3H), 2.24(s,3H)
47	δ 7.6-7.2(m,9H),5.4-5.2(m,2H),3.87,3.83(s,3H),3.41,3.40(s,3H)
48	δ 7.6(m,3H),7.44(m,2H),7.35(m,3H),7.25(m,1H),5.26(d,1H),5.22(d,1H), 3.88(s,3H),3.49(s,3H),2.20(s,3H)
49	δ 7.5(d,1H),7.40(m,4H),7.23(m,2H),7.18(d,1H),5.26(d,1H),5.21(d,1H), 3.88(s,3H)3.41(s,3H),2.36(s,3H),2.19(s,3H)
50	δ 7.56(m,3H),7.45(m,2H),7.25(m,1H),6.86(d,2H),5.24(d,1H),5.19(d,1H), 3.88(s,3H),3.81(s,3H),3.41(s,3H),2.17(s,3H)
51	δ 7.5(m,2H),7.45(m,3H),7.3(m,3H),5.27(d,1H),5.22(d,1H),3.89(s,3H)
52	δ 8.02,8.01(s,1H),7.8,7.7(m,1H),7.45(m,2H),7.35(m,4H),7.25(m,2H),5.25 (m,1H),3.88,3.74(s,3H),3.45,3.39(s,3H),1.62-1.56(m,3H)
53	δ 8.04(s,1H),7.81(m,1H),7.45(m,2H),7.38-7.18(m,5H),5.18(s,2H), 3.86(s,3H),3.42(s,3H),2.38(s,3H)

Results for Tests A-F are given in Table 1. In the table, a rating of 100 indicates 100% disease control and a rating of 0 indicates no disease control (relative to the controls).

Table 1

<u>Cmpd No.</u>	<u>Test</u> <u>A</u>	<u>Test</u> <u>B</u>	<u>Test</u> <u>C</u>	<u>Test</u> <u>D</u>	<u>Test</u> <u>E</u>	<u>Test</u> <u>F</u>
1	57	79	0	0	17	68
2	86	93	0	0	100	0
3	57	79	0	61	100	68
4	0	0	0	0	100	0
5	99	100	0	46	100	43
6	98	100	36	85	100	42
7	73	9	0	33	5	3
8	0	0	0	0	35	46
9	0	0	0	0	35	0
10	35	3	0	43	78	0
11	100	100	0	64	100	50
12	95	97	0	47	92	71
13	98	100	0	0	69*	63

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14	78	81	0	0	0	0
15	100	100	0	63	100	36
16	92	57	0	0	0	0
17*	78	91	0	0	36	44
18	52	0	0	0	0	0
19	0	0	0	0	0	62
20	63	84	0	26	99	65
21	-	-	0	-	-	-
22	38	100	0	47	100	47
23	38	89	0	0	100	0
24	0	98	97	47	100	70
25	0	84	88	16	100	0
26	72	100	0	73	100	44
27	72	93	0	16	100	2
28	83	97	19	59	100	0
29	16	97	0	25	8	0
30	95	96	0	47	100	47
31	89	99	0	46	100	0
32	60	53	0	0	100	47
33	95	98	0	77	100	0
34	90	100	88	64	100	0
35	0	97	0	0	99	9
36	63	93	62	46	100	0
37	98	100	93	63	100	48
38	0	99	73	26	100	0
39	32	85	73	0	45	0
40	59	97	93	0	76	49
41	97	100	0	0	100	0
42	92	100	62	64	100	68
43	97	99	50	26	97	0
44	73	100	0	47	100	69
45	94	100	0	0	100	47
46	100	100	100	93	100	0
47	96	100	0	0	100	0
48	100	100	0	47	100	0
49	100	100	88	86	100	47

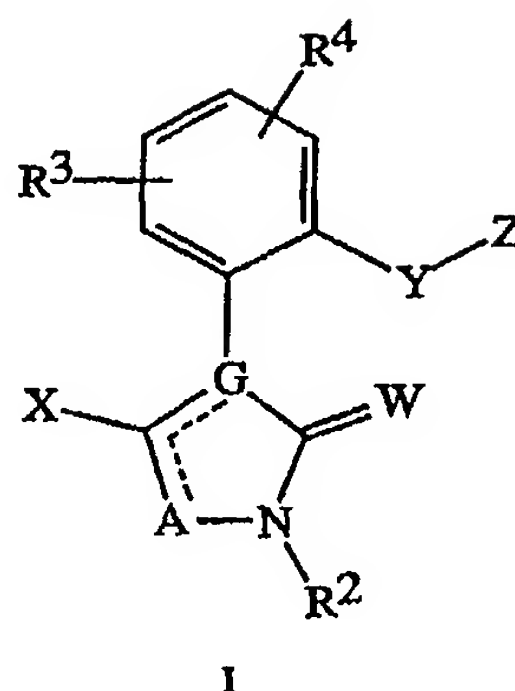
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50	92	100	97	77	-	45
51	100	100	100	97	-	89

* Tested at 40 ppm.

What is claimed is:

1. A compound of Formula I

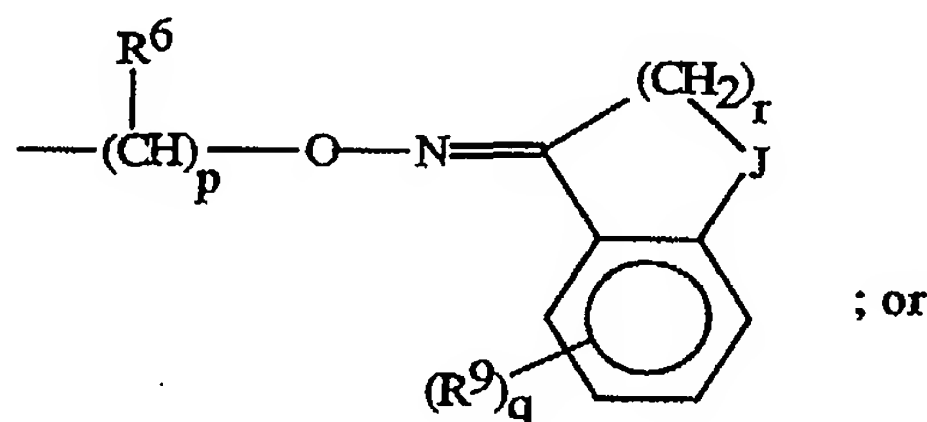


wherein:

- 5 A is O; S; N; NR⁵; or CR¹⁴;
 G is C or N; provided that when G is C, A is O, S or NR⁵ and the floating double bond is attached to G; and when G is N, A is N or CR¹⁴ and the floating double bond is attached to A;
 W is O or S;
- 10 X is OR¹; S(O)_mR¹; or halogen;
 R¹, R², and R⁵ are each independently H; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; C₃-C₆ cycloalkyl; C₂-C₄ alkylcarbonyl; C₂-C₄ alkoxycarbonyl; or benzoyl optionally substituted with R¹³;
- 15 R³ and R⁴ are each independently H; halogen; cyano; nitro; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₂-C₆ alkenyloxy; or C₂-C₆ alkynyloxy;
- 20 Y is -O-; -S(O)_n-; -CHR⁶CHR⁶-; -CR⁶=CR⁶-; -C≡C-; -CHR⁶O-; -OCHR⁶-; -CHR⁶S(O)_n-; -S(O)_nCHR⁶-; -CHR⁶O-N=C(R⁷)-; -(R⁷)C=N-OCH(R⁶)-; -C(R⁷)=N-O-; -O-N=C(R⁷)-; -CHR⁶OC(=O)N(R¹⁵)-; or a direct bond; and the directionality of the Y linkage is defined such that the moiety depicted on the left side of the linkage is bonded to the phenyl ring and the moiety on the right side of the linkage is bonded to Z;
- 25 R⁶ is independently H or C₁-C₃ alkyl;
 R⁷ is H; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; C₃-C₆ cycloalkyl; C₂-C₄ alkylcarbonyl; C₂-C₄ alkoxycarbonyl; cyano; or morpholinyl;

5 Z is C₁-C₁₀ alkyl, C₂-C₁₀ alkenyl, or C₂-C₁₀ alkynyl each optionally substituted with R⁸; or Z is C₃-C₈ cycloalkyl or phenyl each optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰; or Z is a 3 to 14-membered nonaromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, or Z is 5 to 14-membered aromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, each nonaromatic or aromatic ring system containing 1 to 6 heteroatoms independently selected from the group 1-4 nitrogen, 1-2 oxygen, and 1-2 sulfur, each nonaromatic or aromatic ring system optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰; or R⁷ and Z are taken together to form CH₂CH₂CH₂, CH₂CH₂CH₂CH₂, CH₂CH₂OCH₂CH₂, each CH₂ group optionally substituted with 1-2 halogen; or

Y and Z are taken together to form



15 R³, Y, and Z are taken together with the phenyl ring to form a naphthalene ring substituted on either ring with a floating R⁴; provided that when R³, Y, and Z are taken together with the phenyl ring to form a naphthylene ring substituted by R⁴, and A is S, W is O, X is SCH₃ and R² is CH₃, then R⁴ is other than H;

20 J is -CH₂-; -CH₂CH₂-; -OCH₂-; -CH₂O-; -SCH₂-; -CH₂S-; -N(R¹⁶)CH₂-; or -CH₂N(R¹⁶)-; each CH₂ group optionally substituted with 1 to 2 CH₃;
R⁸ is 1-6 halogen; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₁-C₆ alkylthio; C₁-C₆ haloalkylthio; C₁-C₆ alkylsulfinyl; C₁-C₆ alkylsulfonyl; C₃-C₆ cycloalkyl; C₃-C₆ alkenyloxy; CO₂(C₁-C₆ alkyl); NH(C₁-C₆ alkyl); N(C₁-C₆ alkyl)₂; cyano; or nitro; or R⁸ is phenyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, furanyl, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R¹¹, R¹², or both R¹¹ and R¹²;

30 R⁹ is 1-2 halogen; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₁-C₆ alkylthio; C₁-C₆ haloalkylthio; C₁-C₆ alkylsulfinyl; C₁-C₆ alkylsulfonyl; C₃-C₆ cycloalkyl; C₃-C₆ alkenyloxy; CO₂(C₁-C₆ alkyl); NH(C₁-C₆ alkyl); N(C₁-C₆ alkyl)₂; -C(R¹⁸)=NOR¹⁷; cyano; or nitro; or R⁹ is phenyl, benzyl,

benzoyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, thienyloxy, furanyl, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R¹¹, R¹², or both R¹¹ and R¹²;

R¹⁰ is halogen; C₁-C₄ alkyl; C₁-C₄ haloalkyl; C₁-C₄ alkoxy; nitro; or cyano; or R⁹ and R¹⁰, when attached to adjacent atoms, are taken together as -OCH₂O- or -OCH₂CH₂O-; each CH₂ group optionally substituted with 1-2 halogen;

R¹¹ and R¹² are each independently halogen; C₁-C₄ alkyl; C₁-C₄ haloalkyl; C₁-C₄ alkoxy; C₁-C₄ haloalkoxy; nitro; or cyano;

R¹³ is halogen; C₁-C₃ alkyl; C₁-C₃ haloalkyl; C₁-C₃ alkoxy; C₁-C₃ haloalkoxy; nitro; or cyano;

R¹⁴ is H; halogen; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; or C₃-C₆ cycloalkyl;

R¹⁵, R¹⁶, R¹⁷, and R¹⁸ are each independently H; C₁-C₃ alkyl; or phenyl optionally substituted with halogen, C₁-C₄ alkyl, C₁-C₄ haloalkyl, C₁-C₄ alkoxy, C₁-C₄ haloalkoxy, nitro or cyano;

m, n and q are each independently 0, 1 or 2; and p and r are each independently 0 or 1.

2. A compound of Claim 1 wherein

W is O;

R¹ is C₁-C₃ alkyl or C₁-C₃ haloalkyl;

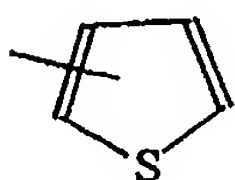
R² is H; C₁-C₆ alkyl; C₁-C₆ haloalkyl; or C₃-C₆ cycloalkyl;

R³ and R⁴ are each independently H; halogen; cyano; nitro; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₁-C₆ alkoxy; or C₁-C₆ haloalkoxy;

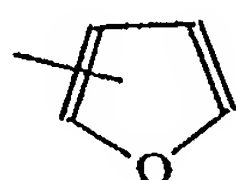
Y is -O-; -CH=CH-; -CH₂O-; -OCH₂-; -CH₂S(O)_n-; -CH₂O-N=C(R⁷)-; -C(R⁷)=N-O-; -CH₂OC(O)NH-; or a direct bond;

R⁷ is H; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₂-C₆ alkenyl; C₂-C₆ alkynyl; or cyano;

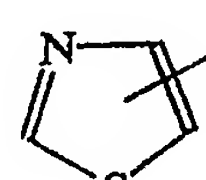
Z is C₁-C₁₀ alkyl optionally substituted with R⁸; or C₃-C₈ cycloalkyl or phenyl, each optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰; or Z is



Z-1

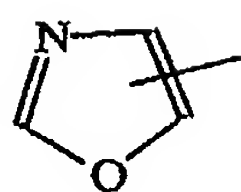


Z-2

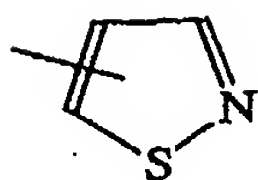


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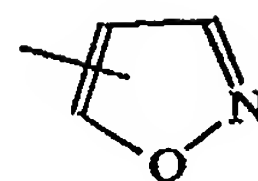
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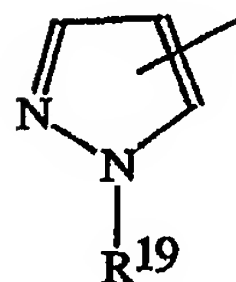
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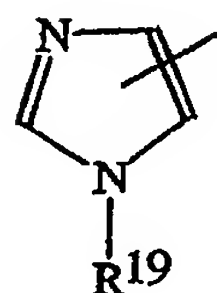
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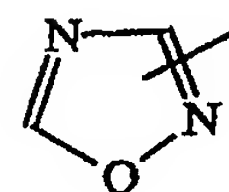
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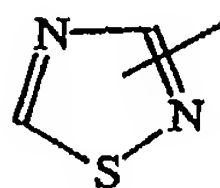
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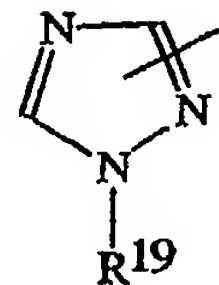
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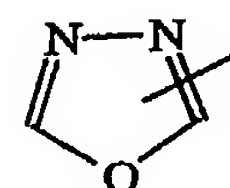
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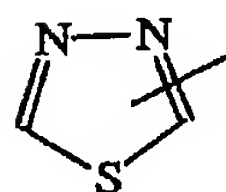
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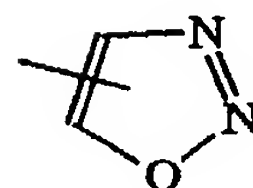
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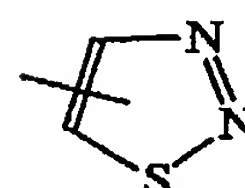
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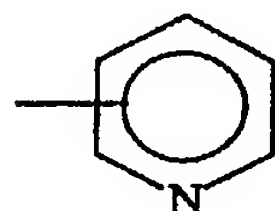
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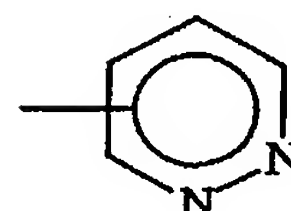
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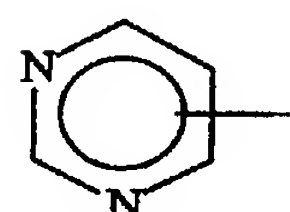
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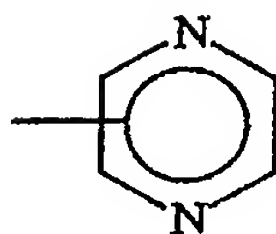
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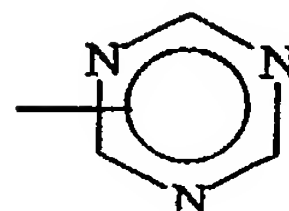
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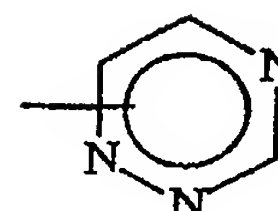
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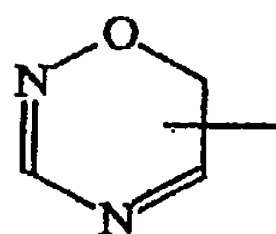
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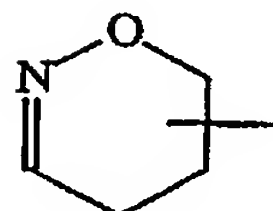
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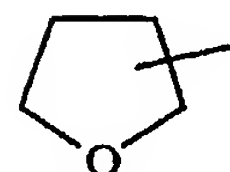
Z-21



Z-22



Z-23

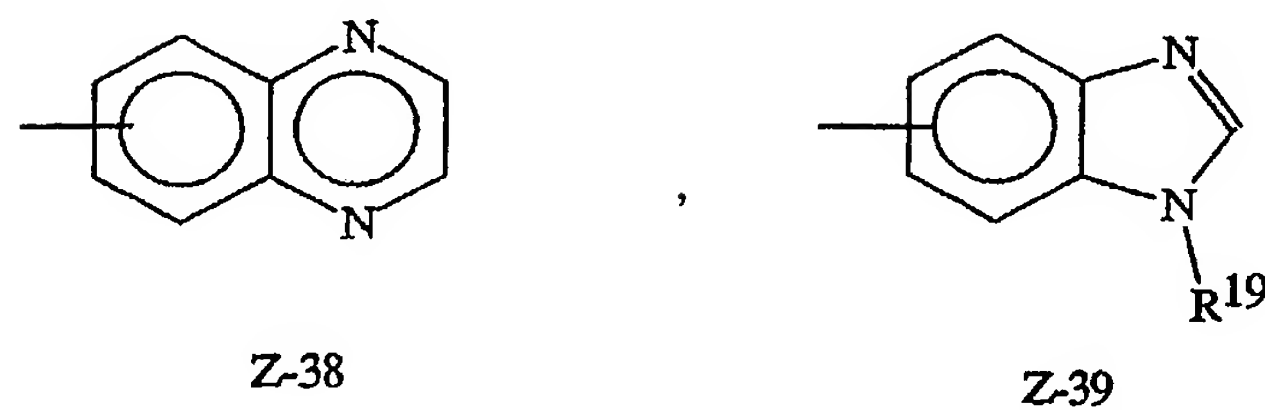
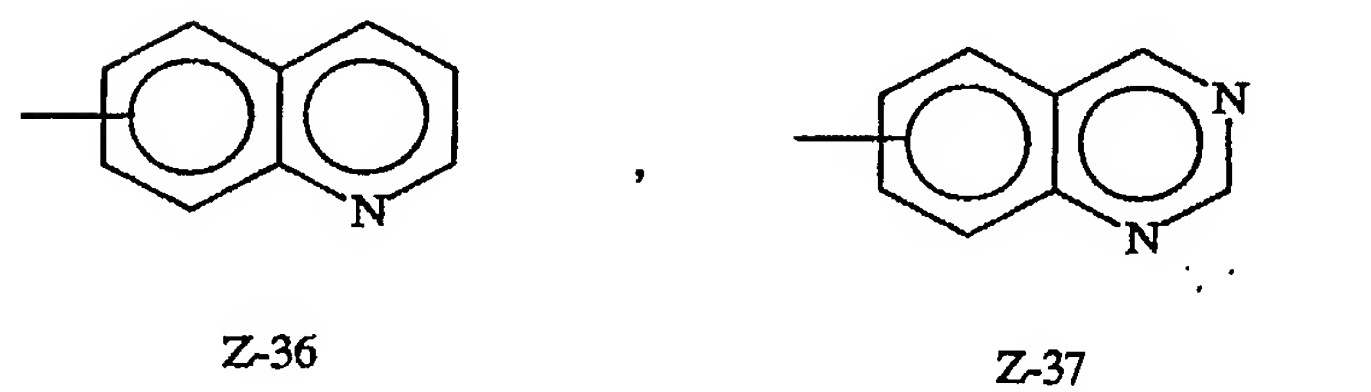
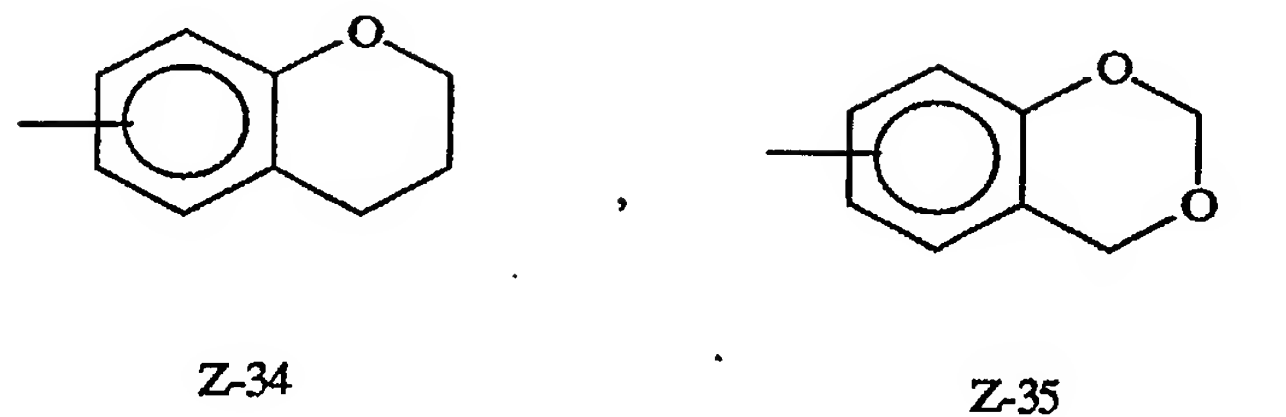
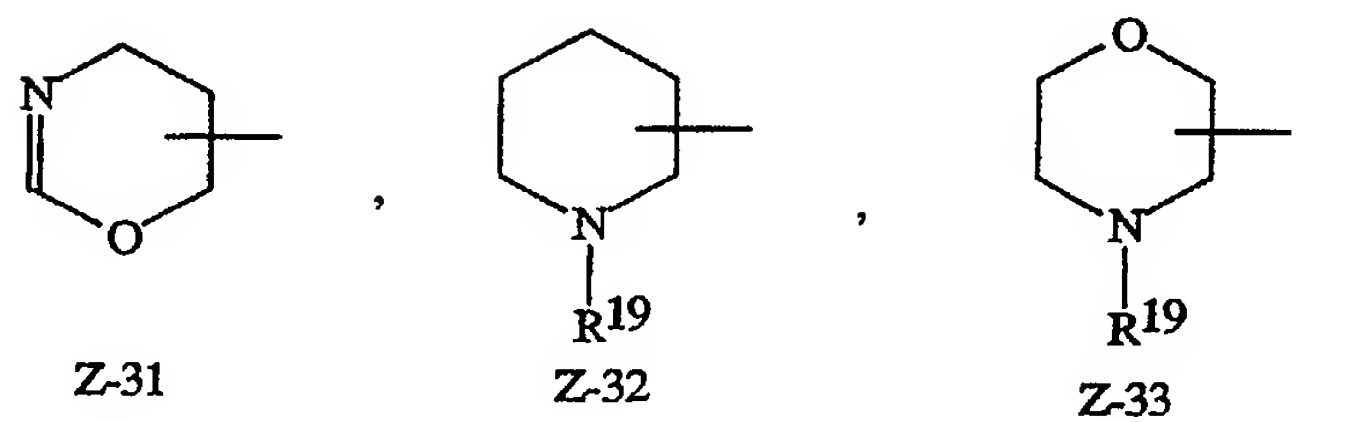
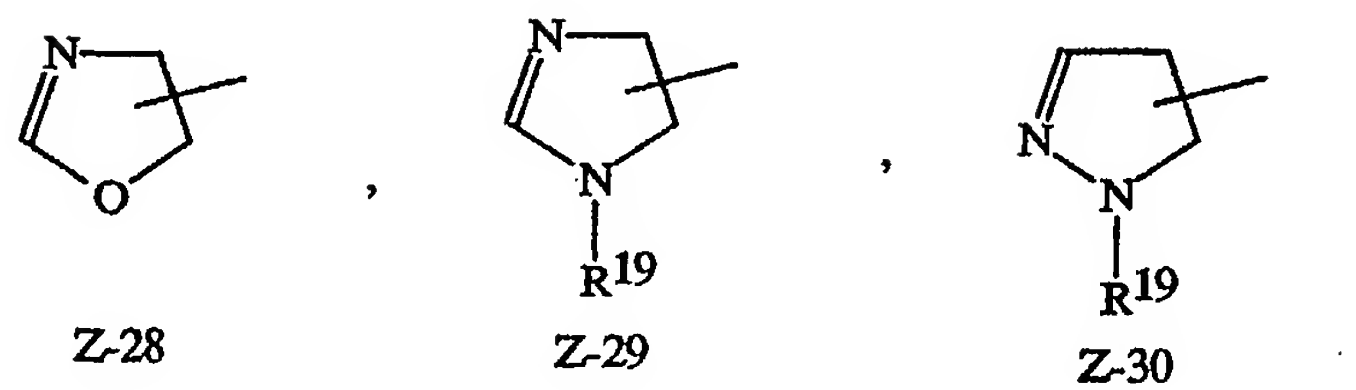
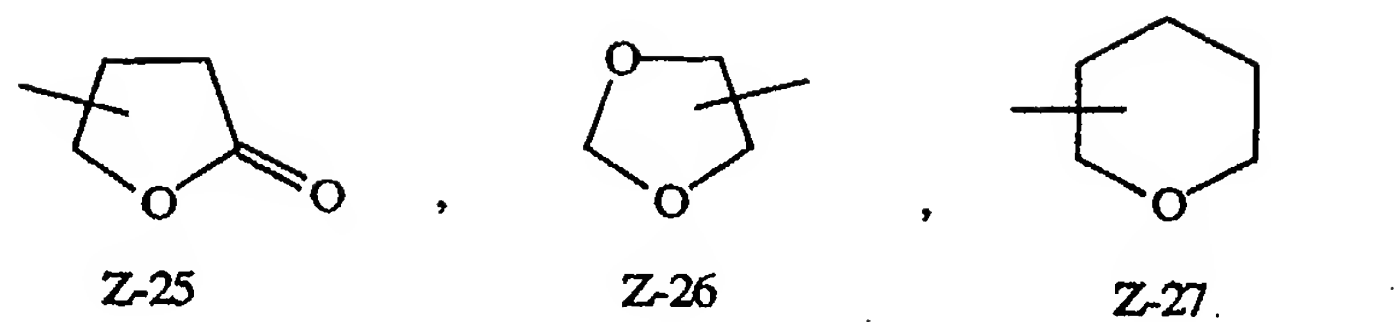


Z-24

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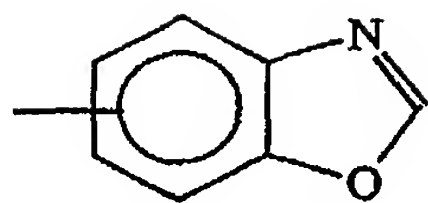
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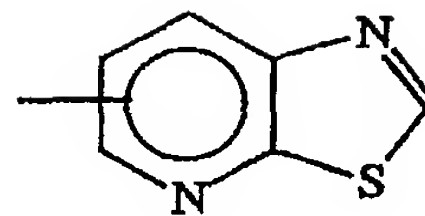
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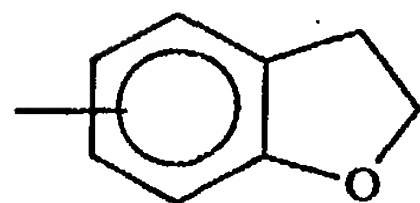
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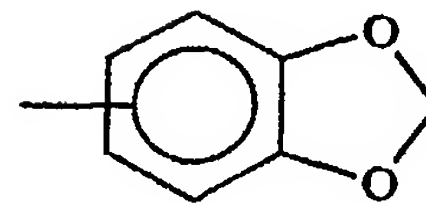
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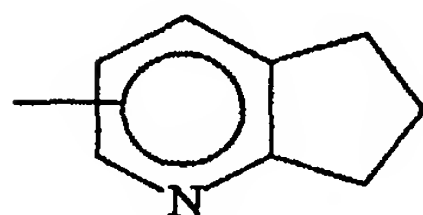
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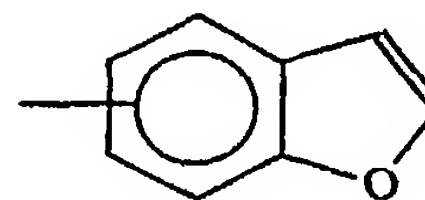
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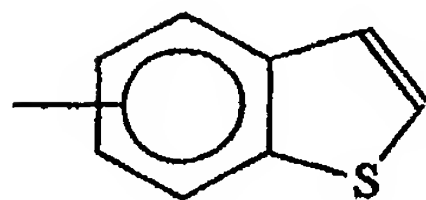
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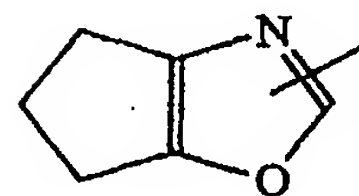
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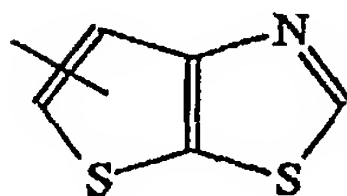
Z-45



Z-46

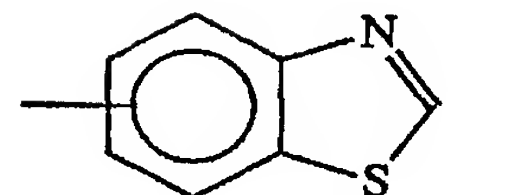


Z-47



Z-48

or



Z-49

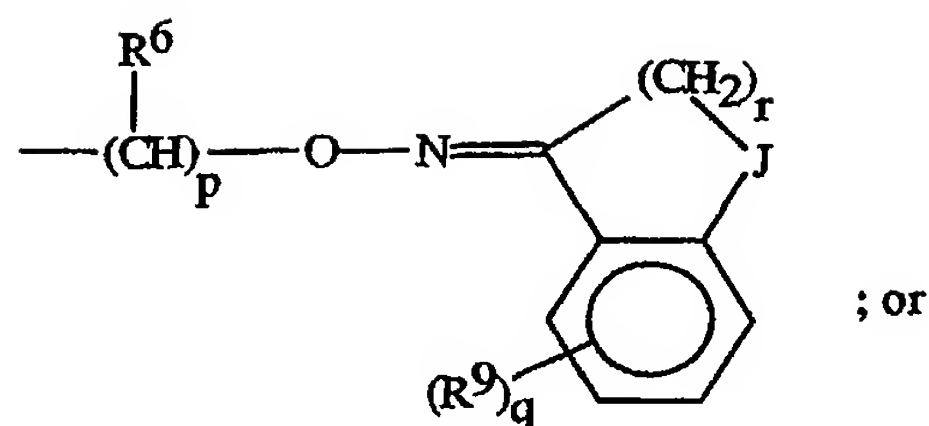
10

each group optionally substituted with one R^9 , R^{10} , or both R^9 and R^{10} ;
or

R^3 , Y, and Z are taken together with the phenyl ring to form a
naphthalene ring substituted on either ring with a floating R^4 ; or
Y and Z are taken together to form

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R^8 is 1-6 halogen; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; or R^8 is phenyl, phenoxy, pyridinyl, pyridinyloxy, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and R^{12} ;

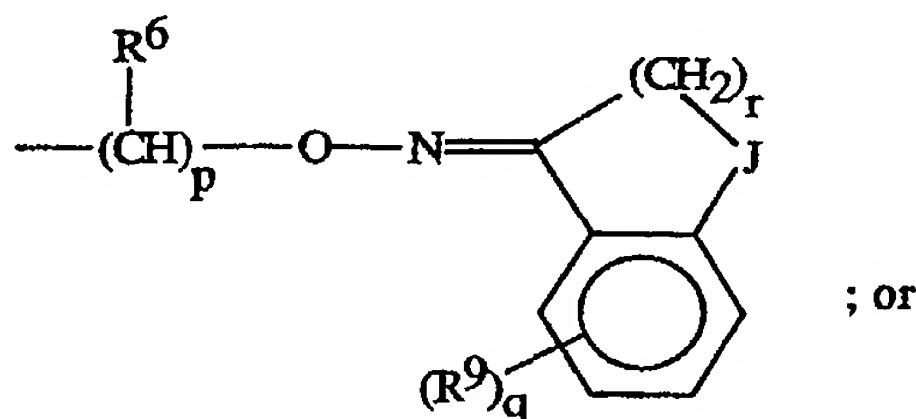
R^9 is 1-2 halogen; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; C_1 - C_6 alkylthio; cyano; $CO_2(C_1$ - C_6 alkyl); $NH(C_1$ - C_6 alkyl); or $N(C_1$ - C_6 alkyl) $_2$; or R^9 is C_3 - C_6 cycloalkyl, phenyl, phenoxy, pyridinyl, pyridinyloxy, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and R^{12} ; and

R^{19} is H; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; or phenyl optionally substituted with halogen, C_1 - C_4 alkyl, C_1 - C_4 haloalkyl, C_1 - C_4 alkoxy, C_1 - C_4 haloalkoxy, nitro or cyano.

3. A compound of Claim 2 wherein

Z is phenyl or Z-1 to Z-21, each optionally substituted with one of R^9 , R^{10} , or both R^9 and R^{10} ; or

Y and Z are taken together to form



J is $-CH_2-$ or $-CH_2CH_2-$;

p is 0; and

r is 1.

4. A compound of Claim 3 wherein

A is O; N; NR^5 ; or CR^{14} ;

X is OR^1 ;

R^1 is C_1 - C_3 alkyl;

R^2 is H or C_1 - C_2 alkyl;

R^3 and R^4 are each H;

Y is -O-; -CH=CH-; -CH₂O-; -OCH₂-; -CH₂O-N=C(R⁷)-; or
-CH₂OC(=O)NH-;

R⁷ is H; C₁-C₃ alkyl; or C₁-C₃ haloalkyl; and

Z is phenyl, pyridinyl, pyrimidinyl, or thienyl, each optionally substituted
with one of R⁹, R¹⁰, or both R⁹ and R¹⁰;

5. A compound of Claim 4 wherein

A is O or NR⁵;

G is C;

Y is -O-; -CH₂O-; -OCH₂-; or -CH₂O-N=C(R⁷)-; and

R⁷ is H; C₁-C₂ alkyl; or C₁-C₂ haloalkyl.

6. A compound of Claim 4 wherein

A is N or CR¹⁴;

G is N;

Y is -O-; -CH₂O-; -OCH₂-; or -CH₂O-N=C(R⁷)-;

R⁷ is H; C₁-C₂ alkyl; or C₁-C₂ haloalkyl.

7. A compound of Claim 5 wherein

R¹ is methyl;

R² is methyl; and

Z is phenyl optionally substituted with one of R⁹, R¹⁰, or both R⁹ and
R¹⁰.

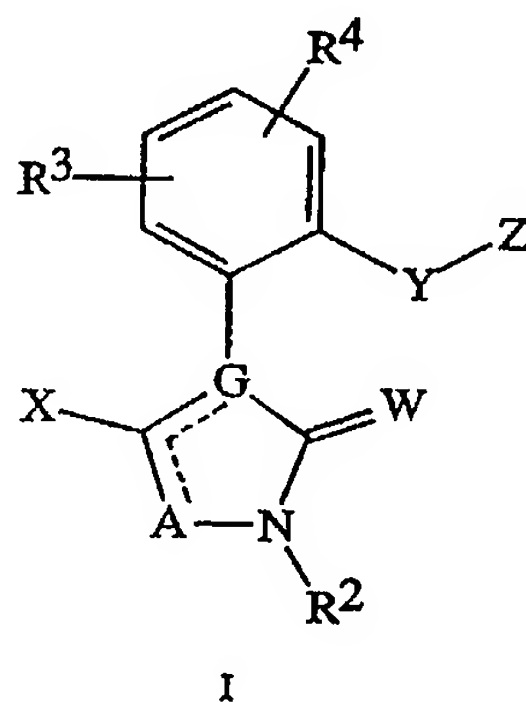
8. A compound of Claim 6 wherein

R¹ is methyl;

R² is methyl; and

Z is phenyl optionally substituted with one of R⁹, R¹⁰, or both R⁹ and
R¹⁰.

9. A fungicidal composition comprising an effective amount of a compound of
Formula I



wherein:

A is O; S; N; NR⁵; or CR¹⁴;

G is C or N; provided that when G is C, A is O, S or NR⁵ and the floating double bond is attached to G; and when G is N, A is N or CR¹⁴ and the floating double bond is attached to A;

W is O or S;

5 X is OR¹; S(O)_mR¹; or halogen;

R¹, R², and R⁵ are each independently H; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; C₃-C₆ cycloalkyl; C₂-C₄ alkylcarbonyl, C₂-C₄ alkoxy carbonyl; or benzoyl optionally substituted with R¹³;

10 R³ and R⁴ are each independently H; halogen; cyano; nitro; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₂-C₆ alkenyloxy; or C₂-C₆ alkynyloxy;

15 Y is -O-; -S(O)_n-; -CHR⁶CHR⁶-; -CR⁶=CR⁶-; -C≡C-; -CHR⁶O-; -OCHR⁶-; -CHR⁶S(O)_n-; -S(O)_nCHR⁶-; -CHR⁶O-N=C(R⁷)-; -(R⁷)C=N-OCH(R⁶)-; -C(R⁷)=N-O-; -O-N=C(R⁷)-; -CHR⁶OC(=O)N(R¹⁵)-; or a direct bond; and the directionality of the Y linkage is defined such that the moiety depicted on the left side of the linkage is bonded to the phenyl ring and the moiety on the right side of the linkage is bonded to Z;

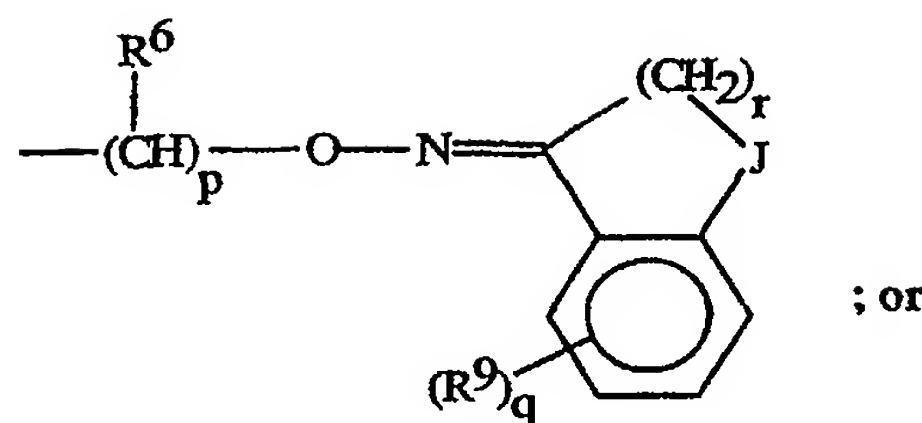
20 R⁶ is independently H or C₁-C₃ alkyl;

R⁷ is H; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; C₃-C₆ cycloalkyl; C₂-C₄ alkylcarbonyl; C₂-C₄ alkoxy carbonyl; cyano; or morpholinyl;

25 Z is C₁-C₁₀ alkyl, C₂-C₁₀ alkenyl, or C₂-C₁₀ alkynyl each optionally substituted with R⁸; or Z is C₃-C₈ cycloalkyl or phenyl each optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰; or Z is a 3 to 14-membered nonaromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, or Z is a 5 to 14-membered aromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, each nonaromatic or aromatic ring system containing 1 to 6 heteroatoms independently selected from the group
30 1-4 nitrogen, 1-2 oxygen, and 1-2 sulfur, each nonaromatic or aromatic ring system optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰; or

35 R⁷ and Z are taken together to form CH₂CH₂CH₂, CH₂CH₂CH₂CH₂, CH₂CH₂OCH₂CH₂, each CH₂ group optionally substituted with 1-2 halogen; or

Y and Z are taken together to form



5 R^3 , Y, and Z are taken together with the phenyl ring to form a naphthalene ring substituted on either ring with a floating R^4 ; provided that when R^3 , Y, and Z are taken together with the phenyl ring to form a naphthylene ring substituted by R^4 , and A is S, W is O, X is SCH_3 and R^2 is CH_3 , then R^4 is other than H;

J is $-\text{CH}_2-$; $-\text{CH}_2\text{CH}_2-$; $-\text{OCH}_2-$; $-\text{CH}_2\text{O}-$; $-\text{SCH}_2-$; $-\text{CH}_2\text{S}-$; $-\text{N}(\text{R}^{16})\text{CH}_2-$; or $-\text{CH}_2\text{N}(\text{R}^{16})-$; each CH_2 group optionally substituted with 1 to 2 CH_3 ;

10 R^8 is 1-6 halogen; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; C_1 - C_6 alkylthio; C_1 - C_6 haloalkylthio; C_1 - C_6 alkylsulfinyl; C_1 - C_6 alkylsulfonyl; C_3 - C_6 cycloalkyl; C_3 - C_6 alkenyloxy; $\text{CO}_2(\text{C}_1$ - C_6 alkyl); $\text{NH}(\text{C}_1$ - C_6 alkyl); $\text{N}(\text{C}_1$ - C_6 alkyl) $_2$; cyano; or nitro; or R^8 is phenyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, furanyl, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and R^{12} ;

15 R^9 is 1-2 halogen; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; C_2 - C_6 alkenyl; C_2 - C_6 haloalkenyl; C_2 - C_6 alkynyl; C_1 - C_6 alkylthio; C_1 - C_6 haloalkylthio; C_1 - C_6 alkylsulfinyl; C_1 - C_6 alkylsulfonyl; C_3 - C_6 cycloalkyl; C_3 - C_6 alkenyloxy; $\text{CO}_2(\text{C}_1$ - C_6 alkyl); $\text{NH}(\text{C}_1$ - C_6 alkyl); $\text{N}(\text{C}_1$ - C_6 alkyl) $_2$; $-\text{C}(\text{R}^{18})=\text{NOR}^{17}$; cyano; or nitro; or R^9 is phenyl, benzyl, benzoyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, thienyloxy, furanyl, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R^{11} , R^{12} , or both R^{11} and R^{12} ;

20 R^{10} is halogen; C_1 - C_4 alkyl; C_1 - C_4 haloalkyl; C_1 - C_4 alkoxy; nitro; or cyano; or R^9 and R^{10} , when attached to adjacent atoms, are taken together as $-\text{OCH}_2\text{O}-$ or $-\text{OCH}_2\text{CH}_2\text{O}-$; each CH_2 group optionally substituted with 1-2 halogen;

25 R^{11} and R^{12} are each independently halogen; C_1 - C_4 alkyl; C_1 - C_4 haloalkyl; C_1 - C_4 alkoxy; C_1 - C_4 haloalkoxy; nitro; or cyano;

R^{13} is halogen; C_1 - C_3 alkyl; C_1 - C_3 haloalkyl; C_1 - C_3 alkoxy; C_1 - C_3 haloalkoxy; nitro; or cyano;

30 R^{14} is H; halogen; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_2 - C_6 alkenyl; C_2 - C_6 haloalkenyl; C_2 - C_6 alkynyl; C_2 - C_6 haloalkynyl; or C_3 - C_6 cycloalkyl;

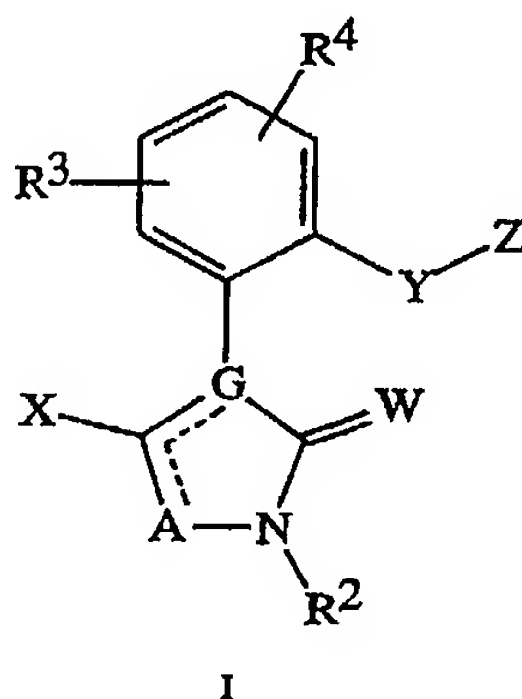
R^{15} , R^{16} , R^{17} , and R^{18} are each independently H; C_1 - C_3 alkyl; or phenyl optionally substituted with halogen, C_1 - C_4 alkyl, C_1 - C_4 haloalkyl, C_1 - C_4 alkoxy, C_1 - C_4 haloalkoxy, nitro or cyano;

m , n and q are each independently 0, 1 or 2;

5 p and r are each independently 0 or 1; and

at least one of (a) a surfactant, (b) an organic solvent, and (c) at least one solid or liquid diluent.

10. A method for controlling plant diseases caused by fungal plant pathogens comprising applying to the plant or portion thereof, or to the plant seed or seedling, an effective amount of a compound of Formula I



wherein:

A is O; S; N; NR^5 ; or CR^{14} ;

15 G is C or N; provided that when G is C, A is O, S or NR^5 and the floating double bond is attached to G; and when G is N, A is N or CR^{14} and the floating double bond is attached to A;

W is O or S;

X is OR^1 ; $S(O)_mR^1$; or halogen;

20 R^1 , R^2 , and R^5 are each independently H; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_2 - C_6 alkenyl; C_2 - C_6 haloalkenyl; C_2 - C_6 alkynyl; C_2 - C_6 haloalkynyl; C_3 - C_6 cycloalkyl; C_2 - C_4 alkylcarbonyl, C_2 - C_4 alkoxy carbonyl; or benzoyl optionally substituted with R^{13} ;

25 R^3 and R^4 are each independently H; halogen; cyano; nitro; C_1 - C_6 alkyl; C_1 - C_6 haloalkyl; C_2 - C_6 alkenyl; C_2 - C_6 haloalkenyl; C_2 - C_6 alkynyl; C_2 - C_6 haloalkynyl; C_1 - C_6 alkoxy; C_1 - C_6 haloalkoxy; C_2 - C_6 alkenyloxy; or C_2 - C_6 alkynyloxy;

30 Y is $-O-$; $-S(O)_n-$; $-CHR^6CHR^6-$; $-CR^6=CR^6-$; $-C\equiv C-$; $-CHR^6O-$; $-OCHR^6-$; $-CHR^6S(O)_n-$; $-S(O)_nCHR^6-$; $-CHR^6O-N=C(R^7)-$; $-(R^7)C=N-OCH(R^6)-$; $-C(R^7)=N-O-$; $-O-N=C(R^7)-$; $-CHR^6OC(=O)N(R^{15})-$; or a direct bond; and

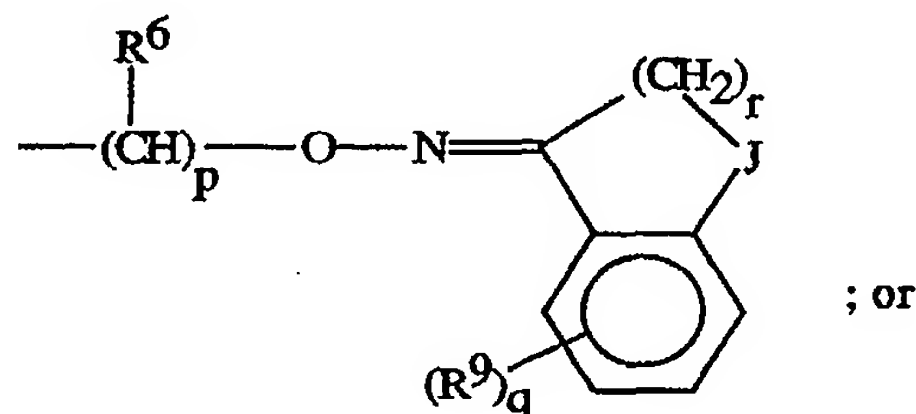
the directionality of the Y linkage is defined such that the moiety depicted on the left side of the linkage is bonded to the phenyl ring and the moiety on the right side of the linkage is bonded to Z;

R⁶ is independently H or C₁-C₃ alkyl;

5 R⁷ is H; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; C₃-C₆ cycloalkyl; C₂-C₄ alkylcarbonyl; C₂-C₄ alkoxy carbonyl; cyano; or morpholinyl;

10 Z is C₁-C₁₀ alkyl, C₂-C₁₀ alkenyl, or C₂-C₁₀ alkynyl each optionally substituted with R⁸; or Z is C₃-C₈ cycloalkyl or phenyl each optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰; or Z is a 3 to 14-membered nonaromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, or Z is a 5 to 14-membered aromatic heterocyclic ring system selected from the group monocyclic ring, fused bicyclic ring and fused tricyclic ring, each nonaromatic or aromatic ring
15 system containing 1 to 6 heteroatoms independently selected from the group 1-4 nitrogen, 1-2 oxygen, and 1-2 sulfur, each nonaromatic or aromatic ring system optionally substituted with one of R⁹, R¹⁰, or both R⁹ and R¹⁰; or
20 R⁷ and Z are taken together to form CH₂CH₂CH₂, CH₂CH₂CH₂CH₂, CH₂CH₂OCH₂CH₂, each CH₂ group optionally substituted with 1-2 halogen; or

Y and Z are taken together to form



25 R³, Y, and Z are taken together with the phenyl ring to form a naphthalene ring substituted on either ring with a floating R⁴; provided that when R³, Y, and Z are taken together with the phenyl ring to form a naphthylene ring substituted by R⁴, and A is S, W is O, X is SCH₃ and R² is CH₃, then R⁴ is other than H;

30 J is -CH₂-; -CH₂CH₂-; -OCH₂-; -CH₂O-; -SCH₂-; or -CH₂S-; -N(R¹⁶)CH₂-; or -CH₂N(R¹⁶)-; each CH₂ group optionally substituted with 1 to 2 CH₃;

R⁸ is 1-6 halogen; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₁-C₆ alkylthio; C₁-C₆ haloalkylthio; C₁-C₆ alkylsulfinyl; C₁-C₆ alkylsulfonyl; C₃-C₆ cycloalkyl; C₃-C₆ alkenyloxy; CO₂(C₁-C₆ alkyl); NH(C₁-C₆ alkyl); N(C₁-C₆ alkyl)₂;

cyano; or nitro; or R⁸ is phenyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, furanyl, pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R¹¹, R¹², or both R¹¹ and R¹²;

5 R⁹ is 1-2 halogen; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₁-C₆ alkoxy; C₁-C₆ haloalkoxy; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₁-C₆ alkylthio; C₁-C₆ haloalkylthio; C₁-C₆ alkylsulfinyl; C₁-C₆ alkylsulfonyl; C₃-C₆ cycloalkyl; C₃-C₆ alkenyloxy; CO₂(C₁-C₆ alkyl); NH(C₁-C₆ alkyl); N(C₁-C₆ alkyl)₂; -C(R¹⁸)=NOR¹⁷; cyano; or nitro; or R⁹ is phenyl, benzyl, benzoyl, phenoxy, pyridinyl, pyridinyloxy, thienyl, thienyloxy, furanyl,
10 pyrimidinyl, or pyrimidinyloxy each optionally substituted with one of R¹¹, R¹², or both R¹¹ and R¹²;

R¹⁰ is halogen; C₁-C₄ alkyl; C₁-C₄ haloalkyl; C₁-C₄ alkoxy; nitro; or cyano; or R⁹ and R¹⁰, when attached to adjacent atoms, are taken together as -OCH₂O- or -OCH₂CH₂O-; each CH₂ group optionally substituted with 1-2 halogen;

15 R¹¹ and R¹² are each independently halogen; C₁-C₄ alkyl; C₁-C₄ haloalkyl; C₁-C₄ alkoxy; C₁-C₄ haloalkoxy; nitro; or cyano;

R¹³ is halogen; C₁-C₃ alkyl; C₁-C₃ haloalkyl; C₁-C₃ alkoxy; C₁-C₃ haloalkoxy; nitro; or cyano;

20 R¹⁴ is H; halogen; C₁-C₆ alkyl; C₁-C₆ haloalkyl; C₂-C₆ alkenyl; C₂-C₆ haloalkenyl; C₂-C₆ alkynyl; C₂-C₆ haloalkynyl; or C₃-C₆ cycloalkyl;

R¹⁵, R¹⁶, R¹⁷, and R¹⁸ are each independently H; C₁-C₃ alkyl; or phenyl optionally substituted with halogen, C₁-C₄ alkyl, C₁-C₄ haloalkyl, C₁-C₄ alkoxy, C₁-C₄ haloalkoxy, nitro or cyano;

m, n and q are each independently 0, 1 or 2; and

25 p and r are each independently 0 or 1.

INTERNATIONAL SEARCH REPORT

Intern. Application No
PCT/US 94/09525

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C07D249/12 C07D261/12 C07D275/03 C07D231/14 C07D233/30
A01N43/74 A01N43/56 A01N43/653 A01N43/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,4 098 896 (L.H. EDWARDS) 4 July 1978 see the whole document, particularly starting material for example 17 ---	1,2,9
X	JOURNAL OF ORGANIC CHEMISTRY, vol.48, no.16, 12 August 1983, WASHINGTON US pages 2654 - 2660 J.F.W. KEANA ET AL. 'Potent hydrophilic dienophiles. Synthesis and aqueous stability of several 4-aryl- and sulfonated 4-aryl-1,2,4-triazoline-3,5-diones and their immobilization on silica gel' see page 2655, compound 17 and page 2656, compound 25 --- -/--	1,2,9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

16 March 1995

Date of mailing of the international search report

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	CHEMICAL ABSTRACTS, vol. 63, no. 6, 13 September 1965, Columbus, Ohio, US; abstract no. 6997e-g, M.S. ABASI ET AL. 'Synthesis of 1-aryl(alkyl)(aralkyl)dithiourazoles' see abstract & J. INDIAN CHEM. SOC., vol.42, no.5, 1965 pages 333 - 335 ---	1,9
X	CHEMICAL ABSTRACTS, vol. 51, no. 14, 25 July 1957, Columbus, Ohio, US; abstract no. 10587i, see abstract & JP,A,3 428 (DAI NIPPON DRUG MANUFG. CO.) 11 May 1956 ---	1,2,9
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X	EP,A,0 508 126 (BAYER AG) 14 October 1992 see the whole document ---	1-9
X	WO,A,92 16510 (CIBA-GEIGY AG) 1 October 1992 see the whole document ---	1-9
X	US,A,4 881 967 (J.E. SEMPLE) 21 November 1989 see the whole document, particularly example 35, column 10, table 13 and column 80, compound 82 ---	1,2,9
A	WO,A,93 07116 (IMPERIAL CHEMICAL INDUSTRIES PLC) 15 April 1993 cited in the application see the whole document -----	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter. nal Application No

PCT/US 94/09525

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